THE IRON AGE

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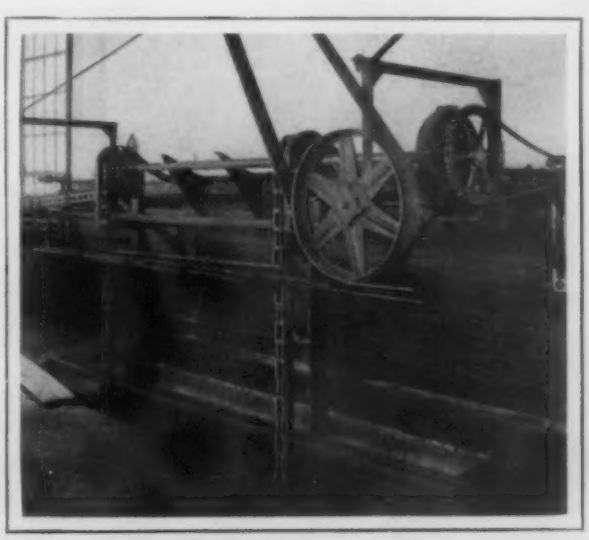
Efficient Handling of Screw Parts

Power and Gravity Conveyors at the Continental Motors Plant to Supply the 210 Machines and Deliver Their Output

BY HARRY C. SPILLMAN*

THE huge industrial expansion which is now taking place was foreseen by only a few manufacturers during the last summer. The few that were fortunate enough to plan for this immense increase are now fully organized to take care of the present demands on their factories. The Continental Motors Company started to double its plant at Muskegon, Mich., at that time and everything was planned to make each individual department more efficient. The automatic screw department was one which received special attention. At present there are 210 automatic screw machines in operation and they consume over 40 tons of bar stock each day, using stock as large as 3¼ in. in diameter. The entire layout was carefully studied and the building designed to take care of the manufacture of these small parts. The method of conveying the stock, the steel shaving bins, handling the finished product and many other labor-saving devices were provided for in the design of the building. Literally speaking, the building was erected around the equipment.



From the Bar Stock Storage Space on the Ground Floor an Endless Vertical Conveyor Takes the Stock to the Third or Machine Floor and Delivers It to a Gravity Conveyor Which in Turn Transports the Material to Points Adjacent to the Machines

A multiple-story building was chosen, as it allows the bar stock to be unloaded directly from the cars, then conveyed to one of the upper floors and the finished product returned by gravity. It was decided to use reinforced concrete construction owing to its fireproof qualities, durability, stiffness and freedom from vibration. This type of building is also very light and sanitary. The building contains over 80,000 sq. ft. of floor space. It is four stories in height, 70 x 180 ft., with an L wing 60 x 120 ft. Excavation was started on July 7, 1915, and the entire building was completed, including wood floors, painting and the elevators in operation on Oct. 20. The machinery and fixtures were immediately installed and placed in operation on Dec. 4, exactly 145 days after work was started on the building.

Concrete construction is used throughout, of skeleton frame design and exposed exterior columns, brick curtain walls and windows of steel sash. The Kahn system of reinforced concrete is used throughout the structure. Each floor is equipped with washrooms, toilets and drinking fountains. Instead of taking space from the main building for the elevators, stairways and toilet rooms, these are located in a separate room built outside the main building lines. This gives a clean uninterrupted working floor space for the interior and simplifies the general construction. Particular pains were taken with the general design in order that it should have an attractive appearance. By the use of concrete, pressed brick and red tile the desired architectural effects were obtained without the use of expensive materials for this purpose. The building was designed with a live floor load of 150 lb. per square foot and portions of the floor are overloaded 400 per cent without showing any signs of deflection. The ceilings are all 13 ft. in the clear, which gives ample room for overhead belts and other equipment suspended from the ceiling.

In the near future the entire building will be given over to the making of small screw parts. At the present time the first, third and a portion of the fourth floor are used for this purpose. The bar stock which is stored on the first floor is unloaded directly from the railroad siding which has the tracks elevated about 4 ft. higher than this floor to assist in the unloading. The stock consists of bars ranging from ⅛ to 3¼ in. in diameter. It is stored in a vertical position, which gives far bet-

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ter access to the stock, makes it easier to handle and places the greater portion of the weight on the floor instead of the rack or the building. It also greatly reduces the weight of the rack and allows a greater storage capacity than racks holding the bar stock in a horizontal position.

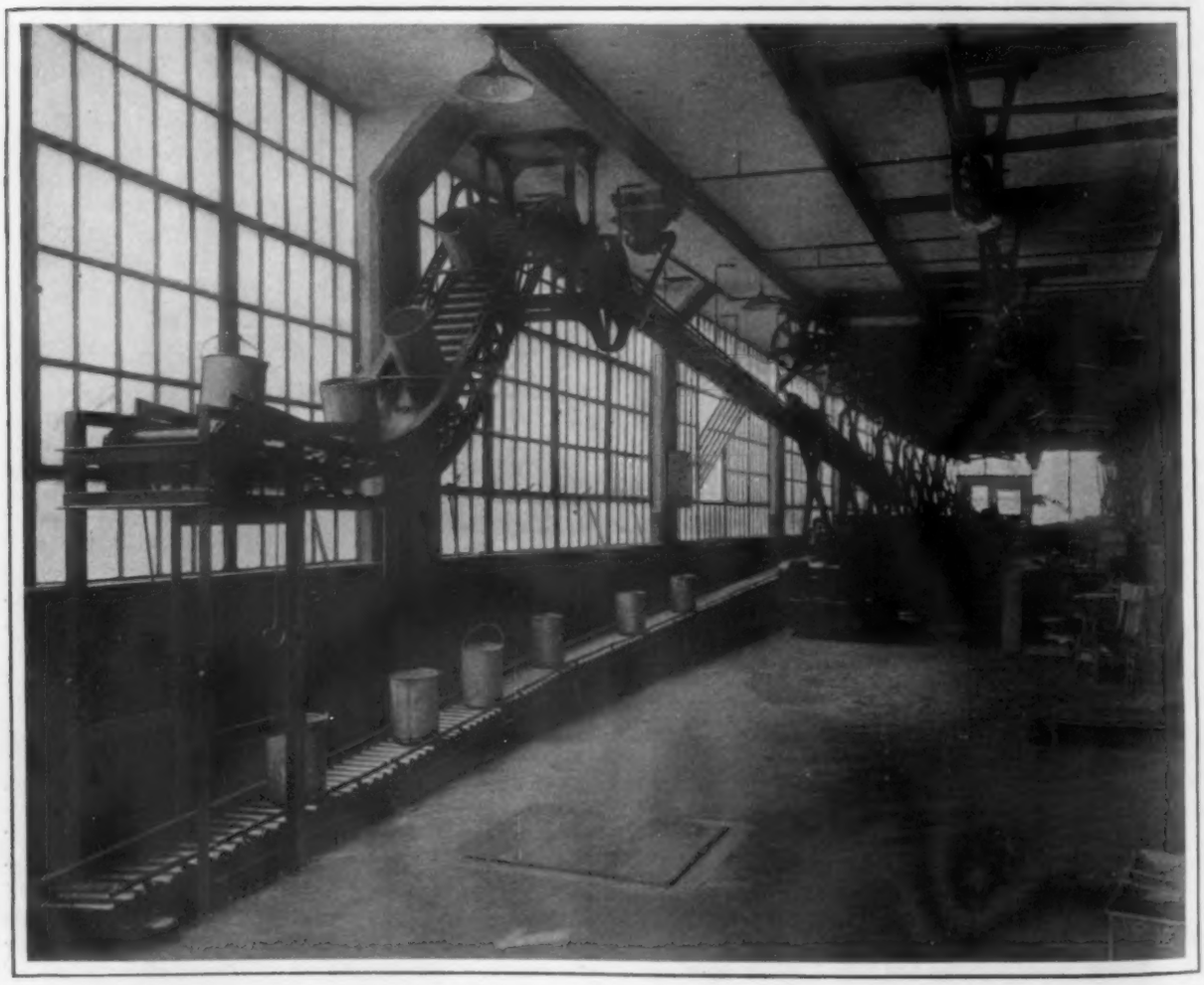
The machine tool equipment is located on the third floor, and consists of 210 automatic screw machines, including Cleveland automatics, which take stock up to 3¼ in., Brown & Sharpe automatics for small stock, National-Acme machines taking stock up to 2⅜ in., Gridleys using stock up to 2¼ in. and Universals which are used on the smaller sizes of stock. Nearly all of these machines are new. The modern machine tools combined with the effective manner of handling the stock and steel shavings make this plant very interesting from an efficiency standpoint.

A special designed endless vertical conveyor carries the stock from the first floor to the machine floor. The stock is dropped on hooks and it lies in a horizontal position. The hooks are supported on two endless chains which operate similar to a bucket conveyor. When the stock reaches the third floor it automatically falls on a horizontal gravity conveyor which conveys it along the wall and allows the different sizes to drop into pockets located underneath the conveyor. The stock is taken from these pockets and carried to the different machines. An electric elevator rated at 6000-lb. capacity is used for conveying the material to the different floors.

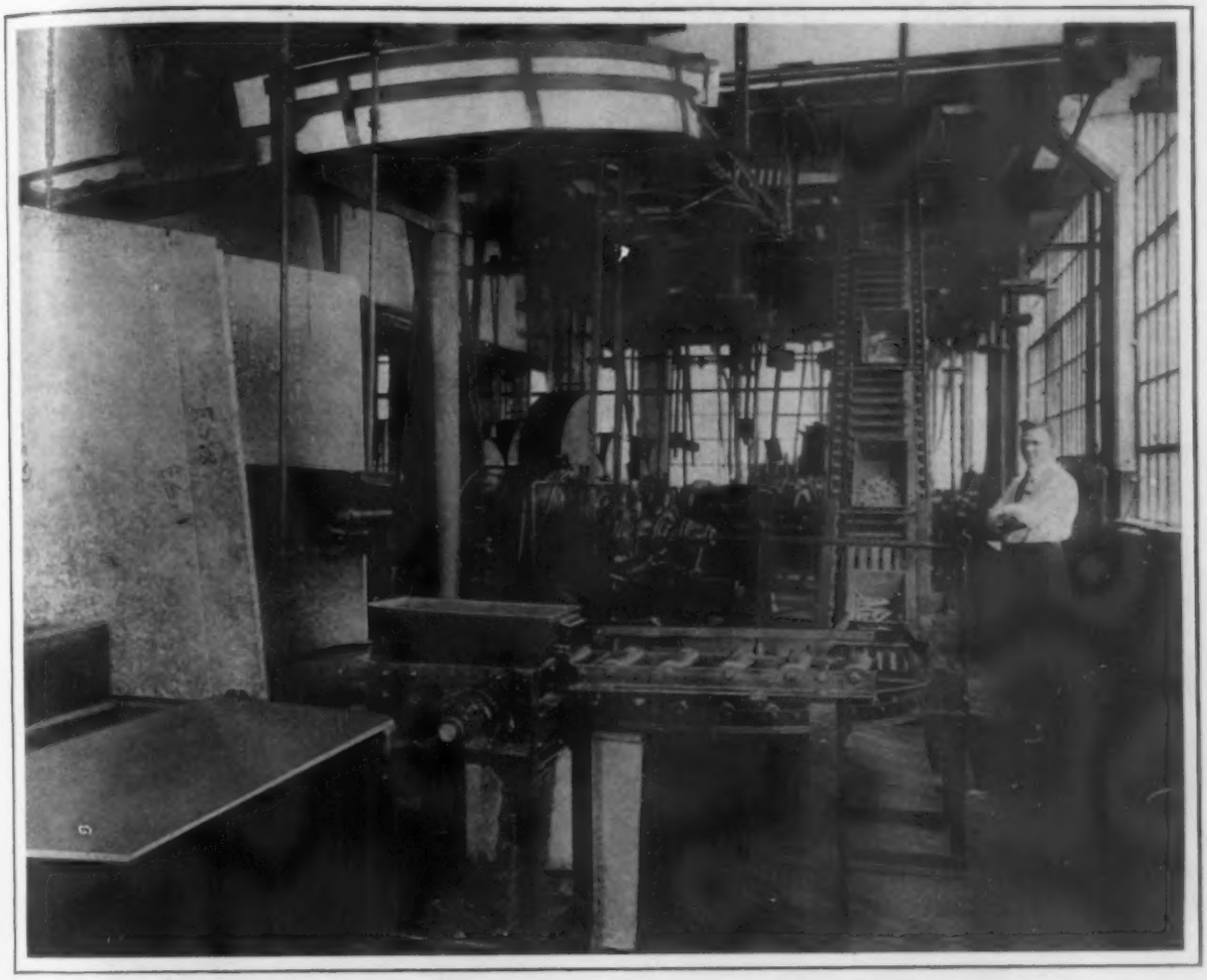
The handling, conveying, cleaning and inspection of the product after being machined is done with very little expense. Power and gravity conveyors and other labor saving devices are used wherever possible. The material and steel chips are collected in small iron pails and placed on a horizontal conveyor which runs along the outside walls of the room and within a few feet of the machines. This conveyor automatically takes the material to the cleaning room. Here the chips and material are placed in an oil extractor where the oil is reclaimed. Specially designed power shakers and fans separate the chips from the machine parts which are collected in perforated tote pans and placed on another horizontal conveyor. The latter passes through two long tanks containing a cleaning fluid which is kept agitated by steam jets in the liquid. As the steel pans pass through this solution it thoroughly cleans the machined parts. After leaving the tanks the boxes pass under a fine spray of thin oil. This process coats the parts with a film of oil and preserves them from rust.

Another conveyor takes the finished product to the top floor for inspection. The inspection room consists of series of individual metal covered benches and the work is done by girls under the supervision of a forewoman. Directly over each conveyor another is located which operates in the opposite direction. These take the empty pails and boxes back to the machines and the cleaning room.

The chips are dumped into a steel chute which slants to a position directly over the railroad siding. This allows a car to be filled right from the cleaning room without the necessity of handling the chips. In case it is impossible to obtain empty cars the chips are dumped into the storage bin which is directly underneath the cleaning room. This bin is built of concrete and is made a part of



The Output of the Machines Is Collected in Small Iron Pails Which Are Placed on the Lower Conveyor for Transportation to the Cleaning Room, the Upper One Being Employed to Return the Empty Pails



Perforated Tote Pans and a Horizontal Conveyor Bring the Machined Parts through the Cleaning Tank and Deliver Them to the Conveyor at the Right Which Runs to the Inspection Department on the Fourth (Top) Floor, the Empty Pans Being Returned by the Gravity Conveyor Just Below the Ceiling

the building. It is divided into three compartments and each compartment is lined with ¼-in. iron and made oil tight. A large door covers the front of each compartment and is operated by a chain hoist. When the door is open it is over the center of the track which allows the steel shavings to be easily shoved from the bin into the cars. Each compartment holds two carloads of chips. This scheme proves a great labor saver over the customary method of loading steel shavings.

The oil from the extractors is conveyed to the basement where it is thoroughly filtered and sterilized by a temperature of 180 deg. It is returned to the machine floor by an automatic rotary pump. There is ample storage for a carload of cutting oil which, of course, is kept separate from the reclaimed oil.

Each machine is given a number and the weight of the bar stock taken to each machine is carefully recorded. The pails containing the finished product and steel shavings bear the same number as the machine. This number remains with the product until it is inspected and weighed. At the end of each day the amount of stock, finished product, steel shavings and other waste is easily ascertained. The amount of scrap material from each machine is also noted and reported each day. By this method the stock does not lose its identity and the exact product from each machine is easily obtained.

The Central Steel Company and the Massillon Rolling Mill Company, Massillon, Ohio, will install a large gas producer plant to supply fuel for the mills of both companies. The contract for the equipment will be placed shortly.

Tungsten from the Argentine

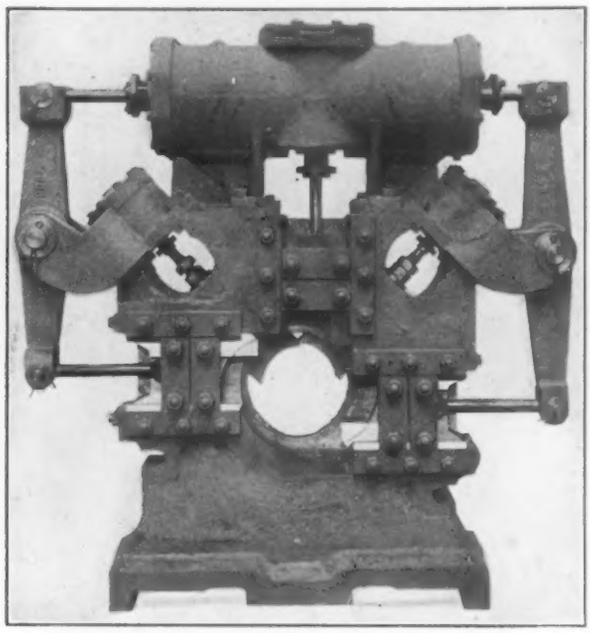
The Hansa Mines, Ltd., in Argentina, can produce about 50 tons per month of tungsten ore, according to U. S. Consul General W. H. Robertson, of Buenos Aires, and until the outbreak of the war the entire output was shipped to Germany. The mine has been largely controlled by German owners reported to be affiliated with the Krupp interests. The total Argentina exports of tungsten ore from 1909 to 1913, inclusive, amounted to 3319 metric tons, of which 3309 tons went to Germany and 10 tons to Great Britain, in 1909 and 1910. Germany in 1912 took 637 tons, with 536 tons in 1913 and 394 tons in 1914. In 1915 the United States became an importer, taking 135 out of a total of 158 exported. To April 1, 1916, the United States took 146 tons. When the war broke out, cutting off the German market, part of the mine's plant closed down reducing production to a limited figure. Now, however, the Hansa Mines are working at full capacity with the announcement that the entire output for 1916 has been contracted for in the United States.

Western Demand for Producer Gas Plants

The demand for producer gas plants has become heavy in parts of the Central West in which manufacturers have been depending largely upon natural gas for fuel. This is due to a considerable extent to the fact that one leading distributor of natural gas has given notice to its larger consumers that the supply of natural gas for manufacturing purposes will be cut off in the near future to conserve the supply for domestic users. Particularly heavy is the demand from the glass industry, which is now installing producer gas equipment to replace natural gas. In this industry cold producer gas is being used for the various melting and annealing operations formerly done with natural gas, hot producer gas and fuel oil.

An Improved Bar Cutting-Off Machine

A new size and different type of air-operated cutting-off machine for bar stock for projectiles is now produced by the Southwark Foundry & Machine Company, Philadelphia, Pa. As compared with the one illustrated in THE IRON AGE, Feb. 3, 1916, the new machine is designed for stock 7 to 10 in. in diameter as against 14 in. The newer machine also embodies in its construction a different arrangement for feeding the tools into the stock and the incorporation of guide cylinders to handle bars that are not absolutely round.



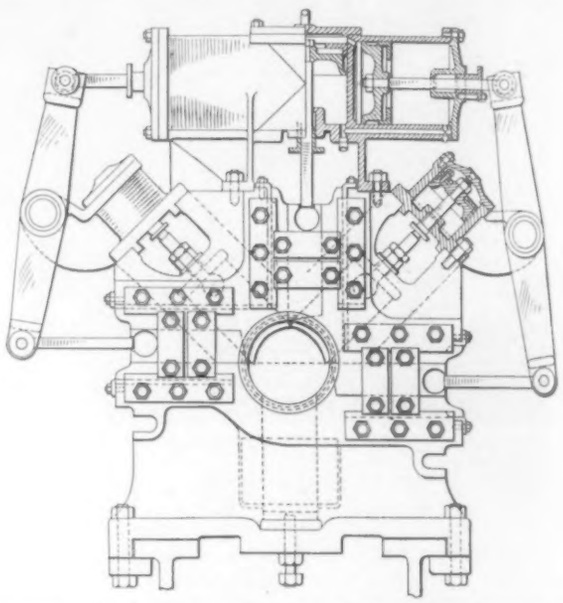
One of the Heads of a New Air-Operated Cutting-Off Machine for Bar Stock Ranging from 7 to 10 In. in Diameter Having Three Tools Cutting Simultaneously in the Same Kerf and Two Guides to Center the Bar

A heavy cast-iron bed supports at one end a quick-acting chuck for gripping the bar and the gearing to transmit power from the driving motor for rotating the stock. A number of cutting-off heads are mounted on the bed and consist of steel castings with five air cylinders on each. Three of the cylinders operate the cutting-off tools, as in the earlier machine, with the exception that formerly each tool had a separate cylinder with an individual air supply, while in the new machine the air is admitted at the top of the cylinder and divides into three parts to operate the three tools, the one pointing downward being acted upon directly, while the ones at the sides are operated through a system of links. In this arrangement, too, the lower tools operate horizontally, while in the earlier machine they were set at an angle. All three tools cut in the same kerf. The remaining cylinders operate guides which center the bar in the machine, this arrangement making possible the cutting of bars that are out of round to the extent of ½ in. in 12 ft. The use of compressed air to bring the tools in contact with the work enables the former to accommodate themselves to irregularities in the bar and in some cases bars that are chipped badly have been handled. The piping used to convey the air to the different heads is arranged in multiple, each head drawing its supply directly from the air supply line.

All the gears are mounted between bearings and the pinions do not overhang. A flexible coupling is located between the motor and the pinion, the latter being journaled in ring oiling bearings, while a substantial cast-iron base is located underneath the motor and pinion bearings.

Air cylinders and a small roller table, which is placed in line with the end of the machine, are employed to handle the stock. This air cylinder pushes the bar through the bushings on the cutting-off head into the chuck and when the cut in the bar has reached the predetermined depth the machine is stopped and the air cylinder at the chuck end pushes the bar from the machine on the roller table from which it goes to the breaking equipment. As the bars are handled in full even after being cut, it is pointed out that the handling is rapid.

The cutting time in seconds is approximately three and one-half times the square of the diameter in inches, the usual practice being to leave about 15 per cent of the original area uncut for the fracture test required by the specifications of the various governments covering the production of shell blanks. For example, a round bar 10 in. in diameter will be cut from the outside to a point where it may be easily broken in about 350 sec. or a trifle less than 6 min.



Elevation Partly in Section of One of the Heads, Showing the Arrangement for Admitting Air to the Horizontal Pistons

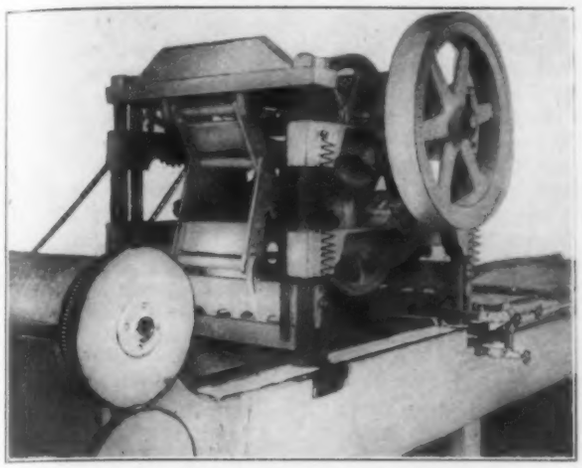
Dominion Steel Corporation's Large Earnings

The Dominion Steel Corporation, Sydney, Nova Scotia, reports for the year ended March 31, 1916, the largest profits in its history. Net manufacturing earnings rose to $7,004,316, an increase of $3,433,258, or 97 per cent, over the previous year, and an increase of $2,290,000 or 21 per cent, over the banner year 1913. After providing for depreciation, interest charges, discount on bonds, etc., the balance available for dividends was $3,995,225, against $855,256 a year ago, an increase of $3,139,969, or 370 per cent. When the corporation preference dividend had been deducted, and allowance made for the full year's dividend on the preferred stocks of the subsidiaries, the balance remaining as net surplus for the year was $3,015,225, equal to 9.39 per cent earned on the $32,097,000 common stock, on which dividends have been suspended for over two years.

Discussing the general aspects of the year's business, President Workman says: "The most important elements in the steel business continue to be those which have resulted from the war. One-fifth of the steel shipped from the works was in forms suitable for the manufacture of shells. One-half the total output was exported. The destination of the greater part of this was Great Britain or France, but considerable tonnages were sent to South Africa, Australia and the United States. British consignments included many parcels for reshipment to India and the far East."

Power Soldering Press

A power-driven soldering press designed for joining and soldering sheets of tin plate into a continuous strip for roofing purposes has been perfected by James Donoghue, 1407 East 111th Street, Cleveland, Ohio.



Soldering Press for Joining Sheets of Tin Plate into a Continuous Roll with Two Sets of Dies for Closing the Seams

The use of this machine will make it possible for mills to furnish tin plate to the trade in continuous rolls instead of in the flat as at present. The machine consists of two presses or dies that operate simultaneously, one, at the right of the engraving, heated by gas or electricity and the other, at the left, cooled with water circulation, both being mounted in one frame and operated by rollers, cams and toggle joints.

The sheets with a lock turned on the edge are hooked together and are fed into the machine, one seam being hot pressed while the seam before it is cold pressed. The movement of the sheet through the machine is controlled by a stop that holds the metal stationary during the pressing operations. After being seamed the sheet passes on to a reel on which it is wound up into a roll. The motion of the reel is imparted from another underneath on which the upper one rests, the lower reel being chain driven from the main shaft.

One man operates the machine, hooking the sections of tin plate together and putting the solder and flux on the seam. The machine is said to have a capacity of four seams per minute or 20 boxes of tin per day. It is claimed that with its use a better and more durable seam can be made than by hand for the reason that the seam will be solid and alike on both sides, the solder penetrating and welding all parts of the seam.

The Samuel Austin & Son Company, Cleveland, Ohio, has changed its name to the Austin Company. This company has gained prominence as a builder of factories.

A Rapid Production Punch Press

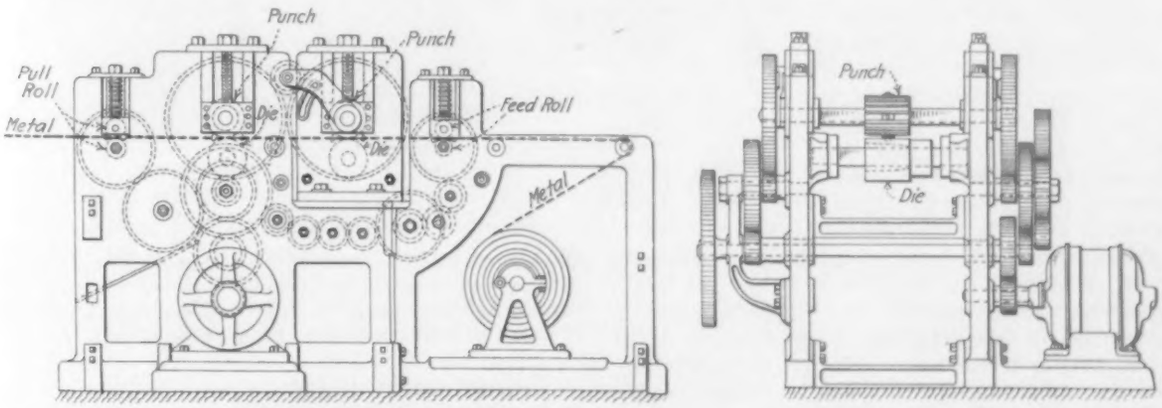
The Malm Machine Company, Dayton, Ohio, has devised a new rotary punch press in which the punch and the die drums are mounted on independent shafts. The punch drum is keyed on the punch driving shaft, while the die drum is mounted on an idler shaft, thus allowing it to revolve freely. Upon the punch drum are mounted multiple punches that engage a similar number of dies mounted on the die drum.

The material is fed from the rear of the machine by automatic feed rollers, and the punchings drop through the die slot into a chute and from there down to containers placed at the front of the machine. The machine is constructed with either one, two or three heads for either plain blanking or piercing and blanking or piercing, blanking and forming. In the last case the forming operation would be the middle one as the blanking operation is always the last.

The punch shaft makes 50 r.p.m., and if the size of the part to be punched warrants putting 20 punches on the punch drum and the corresponding number of dies on the die drum, a machine thus equipped will turn out 1000 complete pieces per minute. It is estimated that 162 hp. driving the punch shaft is sufficient for the heaviest work.

The shape of the piece to be punched is immaterial and the thickness of stock can vary from 0.003 in. up to ⅛ in., and a width of 12 in. can readily be handled. This applies to the stock machine, but wider machines can be built. If the material is very thin and comes in spools, provision is made in the form of a winder designed to take care of the spool, but if the material is in sheets or strips, this is placed upon idlers and is automatically fed by the feed rollers through the machine.

In addition to punching metal, the machine is said to be equally as good on fiber or other goods, and the speed in punching some classes of material is claimed to be very much faster than on a vertical punch press. For making washers up to ⅛ in. thick an output of nearly ten times the record of vertical punch presses is said to be possible. It is emphasized also that with the rotary principle applied in this machine a shearing cut is always made even should the punch or die get dull.



A Rotary Punch Press for Turning Out Various Shapes in Metal or Fiber Up to ⅛ In. in Thickness and 12 In. Wide at a High Rate of Production

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The Van Dorn & Dutton Company, Cleveland, Ohio, reports a good volume of business from Italy in motor gears and pinions. The company's Italian trade has increased largely since the war broke out. Formerly Italy depended largely upon Germany for these products, but it is now placing a large shart of this business in the United States.

Plain Cylindrical Grinding Machine

A new 10 x 36 in. plain cylindrical grinding machine with automatic and hand feeds, designed for general manufacturing purposes, has been brought out by the Perkins Grinder Company, 706 American Trust Building, Cleveland, Ohio. This is a self-contained machine, every unit, including the pump and oil tank, being a part of the machine. It has a maximum swing of 11 in. and a maximum grinding length of 40 in. The control is centralized, all levers and handwheels being on the front of the machine within easy reach of the operator.

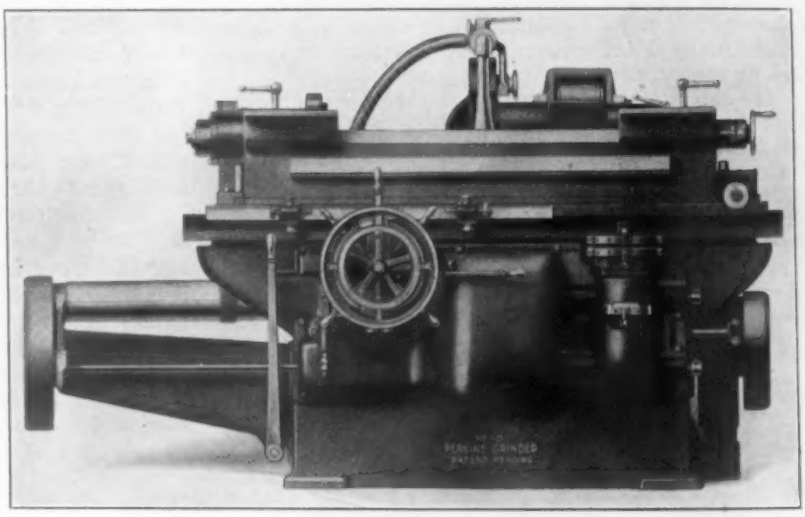
The machine can be driven either by a single clutch pulley through a belt from the lineshaft or by a motor directly connected to the main driving shaft. This shaft runs at a speed of 575 r.p.m. which is equal to the speed of a slow-speed motor. The control box is a separate unit controlling both the work speeds and table feeds and both can be stopped or started independently or together. Changes of speed can be made instantly while the machine is in operation. The transmission and automatic table mechanism are two independent units set in front of the machine, controlled by levers and handwheels, and entirely covered. This cover can be easily removed, making all the interior parts easily accessible. Hand feeds are provided for both the work and the table. No gears run at a speed of over 80 r.p.m. and it is pointed out that this means slight wear and long life for the gears. The transmission runs in oil and all gears are in mesh at all times and arranged so that quick changes can be made.

The work speed changes range from 30 to 300 r.p.m. The table transverse speed changes range from 12 to 120 in. per minute. The automatic cross feed can be set to feed at either or both ends of the table transverse. A variable tarry device is arranged to tarry at each end of the stroke and can be regulated. The table transverse can also be stopped and started with the tarry lever. For grinding tapers up to 2⅛ in. per foot, the table swivels and has two scales graduated in degrees and thousandths of an inch. The grinding wheel spindle is designed to be very powerful and is driven by a 5-in. belt from the main driving shaft which has two sizes of pulleys giving two speeds to the grinding wheel spindle. The work spindle is driven by a Link Belt, obviating any vibration, and is arranged for live and dead centers. The tailstock spindle has a variable spring tension controlled by a handwheel and quick acting lever. The back rest has both vertical and horizontal movement capable of delicate adjustments. The bearings are lined with phosphor bronze, except the high speed bearings, which are of the ball type.

The following table gives additional specifications and dimensions:

Swivel table graduated to included angle of, deg	10
Diameter of headstock spindle, in.	2⅞
Diameter of tailstock spindle, in.	2¼
Diameter of grinding wheel spindle, in.	3½
Length of grinding wheel spindle bearings, in.	8¼
Diameter of grinding wheel spindle pulley, in.	6½
Least reduction of automatic cross feed, in.	0.0005
Greatest reduction of automatic cross feed, in.	0.0050
Diameter of driving clutch pulley, in.	12
Width of main driving belt, in.	5
Power required, hp.	15
Net weight, lb.	6,500
Gross weight crated, lb.	8,500

The equipment includes two grinding wheels, 18 in. in diameter, with either a 2, 4, or 6-in. face, wheel truing device, three back rests, pump and tank and set of dogs and wrenches.



A 10 x 36 In. Plain Cylindrical Manufacturing Grinding Machine Equipped with Automatic and Hand Feeds

Pittsburgh's Permanent Convention Committee

The Pittsburgh convention committee, which recently had charge of the entertainment of the conventions of the Machinery and Supply associations and the American Iron, Steel and Heavy Hardware Association, has decided to make the committee a permanent organization, composed of the five general officers and the nine committee chairmen. The general officers are: H. P. Bope, chairman, Carnegie Steel Company; George T. Bailey, vice-chairman, Oliver Iron & Steel Company; Charles J. Graham, vice-chairman, Graham Nut Company; Charles L. Wood, secretary, Carnegie Steel Company, and G. E. Benson, treasurer, National Tube Company. The committee chairmen are: J. E. McLain, Cambria Steel Company, automobile committee; A. M. Harper, Carnegie Steel Company, banquet committee; H. B. Wheeler, American Sheet & Tin Plate Company, finance committee; J. M. Hansen, Steel Car Forge Company, hospitality committee; C. M. King, McKinney Mfg. Company, ladies' entertainment committee; E. S. Rooney, Youngstown Sheet & Tube Company, publicity committee; J. F. Hazen, Pittsburgh Steel Company, reception committee; W. L. Rodgers, Pittsburgh Gage & Supply Company, speakers' committee, and W. W. Sanderson, Carborundum Company, dinner vaudeville committee. It is the intention of the committee to secure for Pittsburgh as many conventions as possible of bodies composed of manufacturers and consumers of iron and steel products and of other products as are of interest to Pittsburgh.

By a decision of the Indiana Supreme Court the city of Indianapolis is entitled to the property of what was the Winona Technical Institute, in which the National Founders' and Metal Trades associations were much interested. The city has at its disposal over $400,000 for new school buildings, and the probability is that the trade school will be re-established on the grounds. Charles A. Bookwalter, former mayor of the city, and receiver for the Technical Institute, says he expects, within 60 days, to petition for the closing of the receivership, which he has had since 1910.

It is reported in Toronto that four of Canada's largest steel companies are contemplating a merger. Those interested are stated to be the Dominion Steel Corporation, with a capital stock of $50,000,000; Nova Scotia Steel & Coal Company, Ltd., $8,500,000; Lake Superior Corporation, $40,000,000, and Steel Company of Canada, $25,000,000. The total capital stock of the four companies amounts to $123,500,000.

RAILROAD SCRAP PILE SYSTEM

Reclamation Procedure of the Delaware, Lackawanna & Western Railroad

BY FRED WEST

A system to sort and market the scrap of a railroad requires the establishment of a yard with trackage, floors, bins, sheds, roofed inclosures and crane service, together with a large force of workmen. The accompanying illustration shows the arrangement of the scrap yard of the Delaware, Lackawanna & Western Railroad at Scranton, Pa.

The structural part of the yard, exclusive of the crane, is made of reinforced concrete. The floor is on the car-door level and has a length of 25 freight cars. The width of the floor is probably 50 ft., with 30 ft. of this taken up by the bins and sheds, leaving a wide runway with its tram track next to the siding for the freight cars. A traveling crane spans the floor and tracks, and an electro-magnet suspended from the bridge of this crane handles the scrap in unloading, sorting and reloading. There are 25 open bins, each extending 10 ft. along the track, and 30 ft. at right angles to it. These bins are formed by 6-in. reinforced concrete partitions, 6 ft. high at the back and sloping down to 3 ft. or so at the runway. A 2-in. casting caps these partition walls, as shown, to protect them from the abrasion when the stock is dumped into the bins. The structure is continuously subjected to hard knocks, and durable construction is required.

The Scrap Yard of the Delaware, Lackawanna & Western Railroad, Having the Receiving Platform at Car-Door Level and Reinforced Concrete Storage Bins Protected by Iron Castings

In a general way the following classification is made of the railroad scrap: locomotive driver tires, small tires, large wheels, small wheels, chilled iron wheels; axles, rods and forgings; sheets and plates; brakeshoes, grate bars, large castings, small castings, gears, bridge material, switch material, pipe, springs, brass and bronze, babbitt, rubber hose and packing, nuts and bolts, etc. Special assortments are made of car boxes, brake beams, bumpers and couplers and car irons and also for steel, gray-iron or malleable castings, etc. The brass, bronze, babbitt, rubber stuff, small parts and the like are stored in the covered inclosures to protect them from the weather, as they represent higher values as compared with the coarser metals.

There are two methods of handling the scrap at the yard. It may be sorted directly from the car or it may be thrown into a pile on the floor and sorted from there. The latter method is followed where the character of the scrap is such that the freight car would be held too long if the sorting were made from it.

The scrap is sold on bids or quotations, depending upon the quality and kind of the stock and the demands of the market. It furnishes a source of supply for foundries, such as those producing gear wheels and steel, gray-iron and malleable castings. The steel tires from locomotive drivers are largely used in the making of hand shovels. The tires are heated and broken into lengths of 8 or 10 in. and again heated to bright redness and rolled into strip sheets. These sheets are then cut into suitable lengths for the shovel blades and formed by dies under powerful presses. They are then annealed, hardened and tempered, polished and mounted on the handles.

One important feature of a railroad scrap yard is the reclaiming of good pieces that can be put into service again. Large quantities of bolts, washers, rivets and small springs are gathered from the general pile. When these are properly sorted, they become useful stock. Then there are many castings that can be made good as new by slight repairs, and also small castings, or attachments to larger ones, that when properly detached and classified, become a good stockroom asset. Where there is any metal work carrying tin plate or solder, this is carefully reclaimed. Furnaces; shearing, punching and metal sawing machines and gas torches are some of the equipment of a large and well regulated scrap yard. It should be well understood that such a yard must have intelligent and high grade supervision, and that quite a number of trained men are necessary in the crew.

Determining the Capacity of Compressors

A Method Offered Particularly for the User —Accurate Measure of the Machine Installed Without Requiring Laboratory Conditions

BY PAUL DISERENS*

Manufacturers of air compressors usually rate their machines in terms of piston displacement, but since air is an elastic fluid, the amount of air which a compressor will deliver is always something less than its displacement. Thus, it often happens that the purchaser finds, too late, that the machine which he has bought is too small for the service for which it is intended. This is particularly true of the smaller single-stage compressors generally used in the average machine shop or foundry. If in all cases the volumetric efficiency were known, the mistake would be avoided, but the difficulty in checking it nearly always results in the purchaser's accepting the manufacturer's rating.

The volumetric efficiency of an air compressor cylinder is the ratio of the volume of free air, at intake temperature, compressed and actually delivered to the cylinder displacement. Perfect volumetric efficiency, therefore, means not only that the cylinder must be completely filled at each stroke with air under precisely the same conditions as that delivered at the suction intake, but that the entire amount must be compressed and actually delivered to the line. There are a number of sources which operate to introduce volumetric loss. These may be summarized as follows: clearance, wire-drawing, heating of the air during admission to the cylinder, leakage past valves and pistons. The effect of these sources of loss is discussed later.

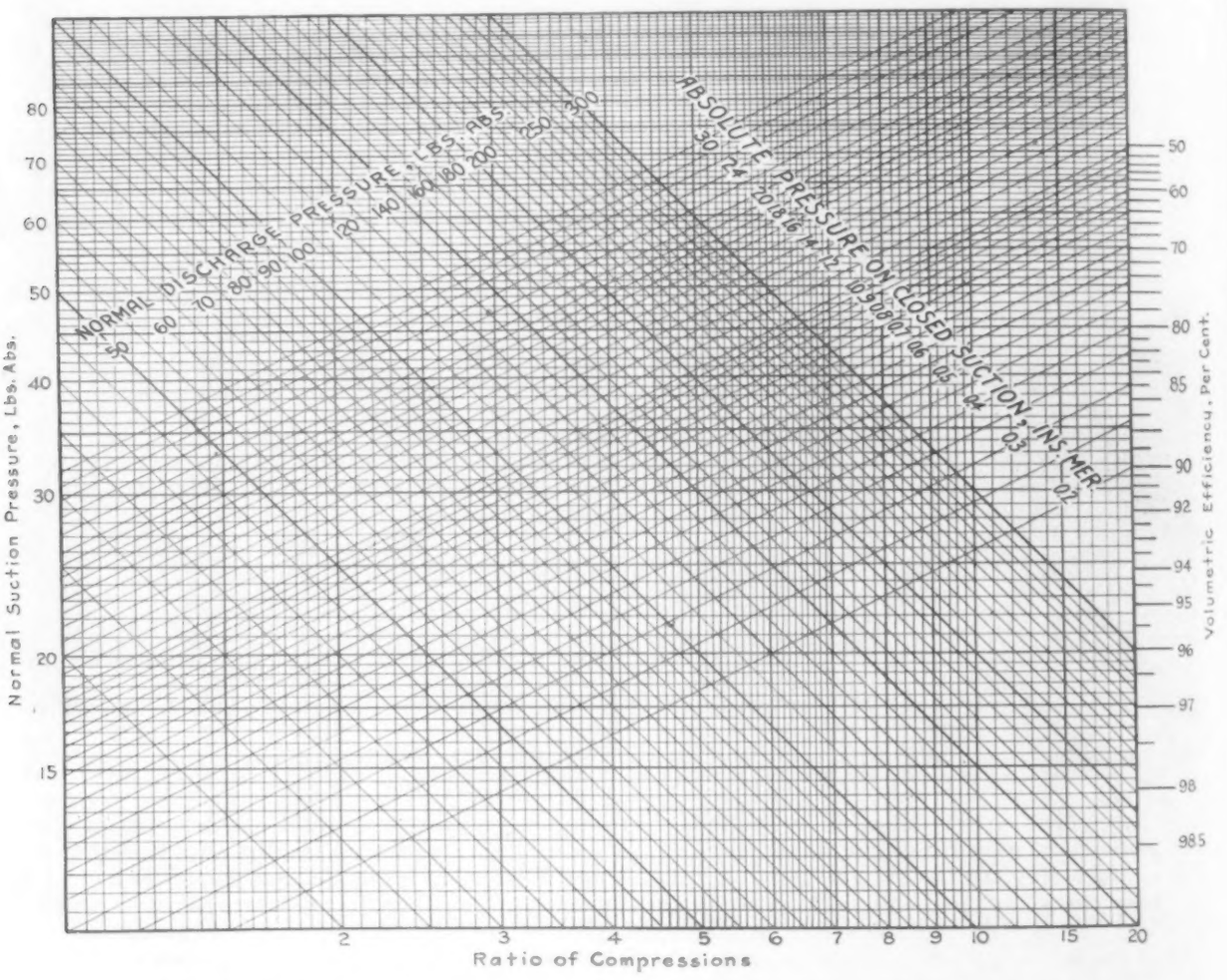

NORMAL DISCHARGE PRESSURE, LBS. ABS.
50 60 70 80 90 100 120 140 160 180 200 250 300
ABSOLUTE PRESSURE ON CLOSED SUCTION, INS. MER.
30 24 20 18 16 14 12 10 09 08 07 06 05 04 03 02
Normal Suction Pressure, Lbs. Abs.
80 70 60 50 40 30 20 15
Volumetric Efficiency, Per Cent.
50 60 70 80 85 90 92 94 95 96 97 98 985
2 3 4 5 6 7 8 9 10 15 20
Ratio of Compressions

FIG. 1—CHART FOR ASCERTAINING VOLUMETRIC EFFICIENCY OF A COMPRESSOR

At the left of the chart select the line representing the intake air pressure under normal operation. Follow it toward the right until it intersects the diagonal line representing the delivery pressure of normal operation. From the point of intersection proceed vertically until the line is reached representing the absolute pressure which exists when the compressor is operated on closed suction. The horizontal line passing through this point gives the volumetric efficiency, noted on the scale at the right.

An accurate determination of the volumetric efficiency of an air compressor involves a careful and precise measurement of the air at discharge pressure delivered to the air-line receiver. Methods for making such measurements have been subject to much investigation in the last few years, and many valuable data have been published concerning them. None, however, has been sufficiently simplified to insure accuracy in results except in so far as laboratory conditions may be realized. In view of the fact that for those interested in the purchase and

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Table I.—*Volumetric Efficiency, 16 x 12-In. Air Cylinder with Hoerbiger-Rogler Valves*

Diam. of Orifice	Air Pressure, Lb. per Sq. In.	Temperature of Suction, Deg. F.	Speed, R.P.M.	Gaging Tank: Pressure, Lb. per Sq. In	Gaging Tank: Temperature	Cu. Ft. of Air Compressed, Corrected for Leakage	Displacement, Cu. Ft. per Min.	Volumetric Efficiency, Per Cent
3	19.5	77.0	51.0	5.47	570	119.8	141.0	84.5
3	20.0	76.0	63.3	1.70	572	152.8	174.8	87.0
3	20.8	76.0	69.8	1.97	557	166.8	193.0	86.0
3	21.5	80.0	81.0	2.76	571	194.8	223.7	86.0
3	21.2	79.0	92.4	3.61	582	220.4	255.0	85.9
3	40.6	77.0	50.0	0.83	576	105.4	138.0	76.2
3	42.5	80.0	65.0	1.43	582	137.8	180.0	76.2
3	40.3	80.0	65.8	1.74	587	150.6	182.0	82.8
3	40.1	80.0	78.0	2.27	593	170.8	216.0	79.1
3	40.0	81.0	94.2	3.45	602	209.8	260.0	80.4
3	59.5	70.0	50.6	4.30	585	106.0	140.0	75.8
3	59.5	72.0	66.0	1.61	578	146.5	182.3	80.0
3	59.9	73.7	79.8	2.19	592	168.5	220.0	76.5
3	60.0	73.0	93.0	2.98	603	194.5	257.0	73.0
3	60.3	74.0	110.7	4.10	618	226.0	306.0	73.7
3	59.9	74.0	109.0	4.15	625	224.0	302.0	74.2
3	59.85	75.2	124.6	5.50	636.5	256.0	343.0	74.6
4	60.25	75.0	144.0	1.89	643.5	266.5	398.0	66.8
3	80.25	73.0	50.0	3.475	560	97.5	138.5	70.6
3	80.5	76.0	65.5	1.105	594.5	120.0	181.0	66.2
3	80.6	76.0	81.5	1.762	607	150.0	226.0	66.4
3	80.5	78.5	96.2	2.70	629.5	184.0	266.0	68.4
3	81.0	81.0	110.4	3.585	643	206.0	306.0	67.3
3	80.5	82.0	49.3	3.535	617	93.0	136.0	68.6
3	81.0	74.0	126.2	5.05	602	252.2	350.0	72.2
3	80.5	78.0	137.0	5.832	644	256.6	379.0	69.5
3	99.2	77.0	49.5	0.55	612	83.6	137.2	66.0
3	100.0	78.0	65.5	1.025	604	118.6	181.0	68.0
3	100.0	80.0	80.0	1.43	615	133.6	207.0	64.5
3	100.0	82.5	94.0	2.40	629	175.0	259.6	66.4
3	100.4	86.0	109.7	3.338	613	203.0	303.0	67.0
3	100.0	87.0	125.5	4.412	649	248.0	348.0	65.5
3	100.0	88.0	134.0	4.982	665	242.0	371.0	65.1

Vacuum on closed suction = 28.08 at 100 r.p.m.
Vacuum on closed suction = 28.10 at 150 r.p.m.
Barometer ..... = 29.48

maintenance of air-compression machinery there is but little opportunity to secure such conditions, there is a great need of some criterion which will accurately define volumetric efficiency or which will at least set a relative measure of efficiency not only applicable to the varying conditions of operation of any particular machine, but also capable of serving as a reliable basis of comparison between two different machines.

The practice of basing volumetric efficiency on measurement from indicator cards is the result of this need. Although some engineers and some manufacturers of air compressors follow this method in expressing guarantees for their apparatus, it is of little value. Many sources of volumetric loss have no effect whatever on the shape of the indicator card. Others, which in some cases might be discernible, are often neutralized by still other losses, and, in addition, the great difficulty experienced in securing accurate indicator cards, especially at high rotative speeds, throws an additional element of doubt on the results obtained. The force of this statement will be more fully appreciated by comparing the volumetric efficiency as shown by indicator cards with that by actual orifice or pilot tube tests, where such data are available. Invariably, the values fail to agree, the volumetric loss shown by the indicator card usually being from 50 to 100 per cent less than that shown by actual measurement.

The formulas and charts which are here presented show the volumetric efficiency in terms of vacuum which the air cylinder can develop with the suction completely closed. The values so determined show a remarkable agreement with the efficiency as determined by the actual measurement of the delivered air. The test to establish the vacuum developed with closed suction may be made by closing the intake of the compressor and allowing it to discharge into the atmosphere; or, if it is a two-stage compressor, by allowing the first stage cylinder to discharge into the atmosphere. This is a test which can be made with far less difficulty and far greater certainty as to results than even a simple orifice test. It requires no special apparatus other than an ordinary mercury column and a barometer or a small mercurial absolute pressure gage.

The accompanying chart has been prepared, by means of which the volumetric efficiency of a compressor working against any discharge pressure and with a given suction pressure can readily be found. For example, take a compressor working under the following conditions: atmospheric intake pressure and 50-lb. discharge. With closed suction, the compressor maintains a vacuum of 28½ in. with a barometer of 30 in.

At the left hand of the chart select the line representing 14½-lb. absolute intake pressure; follow this line to the right until it intersects the diagonal line representing 64½-lb. absolute discharge pressure. From this intersection proceed vertically until the line representing 1½-in. absolute on closed suction is reached. The horizontal line passing through this point represents the volumetric efficiency. Its value will be found on the extreme right of the diagram.

If a compressor is of the two-stage or multi-stage type, it is necessary to consider the first intercooler pressure as the discharge pressure.

The effect of clearance, wire drawing, etc., may now be considered.

Clearance.—The compressed air occupying clearance space at the ends of the stroke must re-expand before air from the intake can enter the cylinder. This represents a definite volumetric loss.

$$l_c = 1 - c\,(r)^{\frac{1}{n}} - c$$

Where l_c is the clearance loss; c, the clearance space; r, the ratio of compression; n, the constant varying from 1 to 1.4.

Loss Due to Wire Drawing.—Reduction in pressure due to friction may result in incomplete filling of the cylinder, and brings about a loss:

$$l_w = \frac{p - p_a}{p_a}$$

l_w being the loss due to wire drawing, p = absolute pressure at beginning of compression, p_a = absolute intake pressure.

Heating of the Air During Admission to the Cylinder.—This loss is measured approximately by the ratio:

$$l_h = \frac{T - T_a}{T_a}$$

T is the absolute temperature of air at the beginning of compression, and T_a is absolute temperature of intake air; l_h is the loss due to heating.

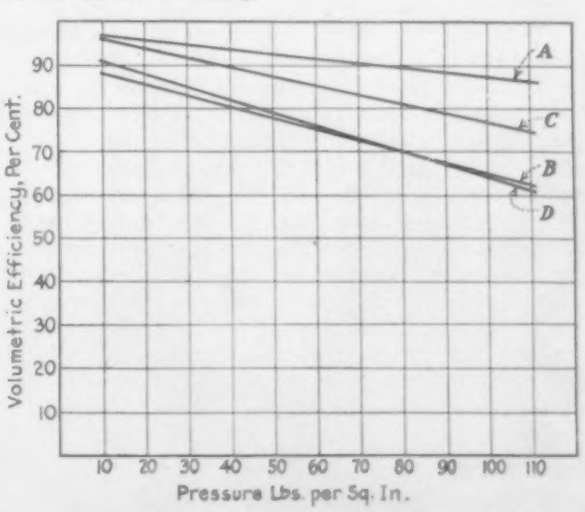


Fig. 2—Methods of Ascertaining Compressor Efficiency Compared. Line *A* represents the theoretical volumetric efficiency; line *B*, the measured volumetric efficiency; line *C*, the indicated efficiency, and line *D*, the efficiency calculated from vacuum developed on closed suction.

Leakage Past Valves or Piston.—With the possible exception of the clearance loss, the loss due to leakage is perhaps the largest and, at the same time, the most indefinite source of loss in volumetric efficiency. In a poorly designed and poorly constructed compressor, it may amount to more than all other losses combined. Its magnitude cannot be expressed by any formula, yet, in general, it can be said to depend upon the same factors which determine the flow of air through an orifice, and, loosely, it may be said to vary directly with the ratio of compression.

Reviewing the several sources of loss as enumerated above, it will be seen that where n is equal to unity, the clearance loss is directly proportional to r; the number of expansions, and that all other losses depend more or less directly upon the value of r. Each one of these losses is, in itself, relatively small. Therefore, taken in the aggregate, they can be evaluated very closely in terms of r, the number of compressions, as a straight-line equation. Thus, it will be permissible to assume that the sum of all losses is directly proportional to the number of compressions and to express volumetric efficiency in terms of the vacuum which the compressor will develop with a closed suction.

This will be better understood if it is remembered that a vacuum pump is in effect identical with an air compressor. The only difference is that a vacuum pump operates from low intake pressures, compressing vapor or air so drawn into atmospheric pressure, usually through a high ratio of compression. It will be clear, therefore, that as the vacuum is reduced, or, in other words, as the intake pressure approaches closer to absolute zero, the number of compressions increases, and the volumetric losses due to clearance, leakage and the heating of intake air correspondingly increase, until a vacuum is reached where these losses are equal to the capacity of the compressor, or, in other words, where its volumetric efficiency is zero.

Expressed algebraically the relationship is as follows:

$$e = 1 - \frac{P_s\,(b - v)}{P_a\,b}$$

Where e = volumetric efficiency, per cent.
P_s = absolute pressure under which compressor normally operates.
P_a = absolute suction pressure.
v = vacuum developed on closed suction, inches of mercury.
b = barometer, inches of mercury.

Take, for example, a compressor working at 50-lb. pressure with atmospheric suction. If, with a closed suction, it is possible to maintain a 28½-in. vacuum with barometer at 30 in., the volumetric efficiency would be:

$$e = 1 - \frac{64.7\,(30 - 28\tfrac{1}{2})}{14.7 \times 30}$$
$$= 1 - 0.22 = 78 \text{ per cent}$$

If the compressor discharges against 100-lb. pressure instead of 50, the volumetric efficiency will be:

$$e = 1 - \frac{114.7\,(30 - 28\tfrac{1}{2})}{14.7 \times 30}$$
$$= 1 - 0.39 = 61 \text{ per cent}$$

As a comparison between the volumetric efficiency as determined by carefully made measurements of the discharged air and by calculation from the vacuum developed on closed suction, the following tests will be of considerable interest. They were made on a 12 x 16 x 12-in. steam-driven compressor fitted with Hoerbiger-Rogler suction and discharge valves, imported from Germany. The tests have been selected as a comparison because they were made after the compressor had been in operation nearly a year and had developed considerable valve leakage, due to the slight dishing peculiar to this type of plate valve after continued running. The air was measured by means of low-pressure orifices, using Professor Durley's formula and coefficients described in the proceedings of the American Society of Mechanical Engineers.

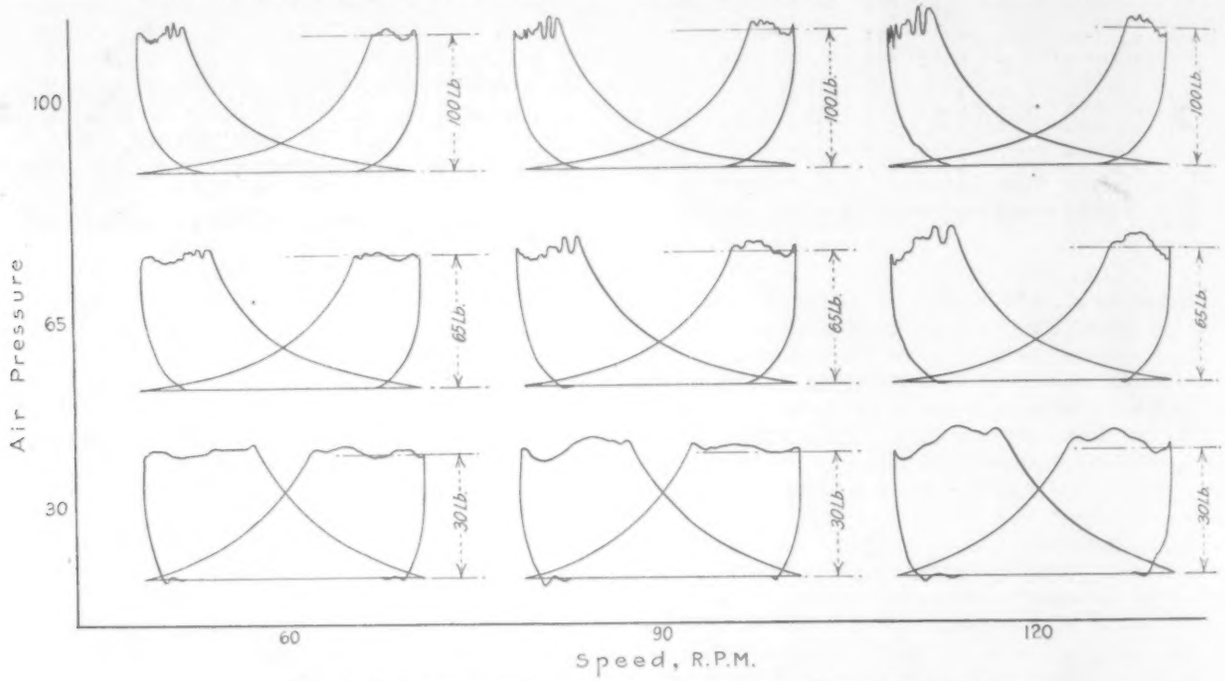


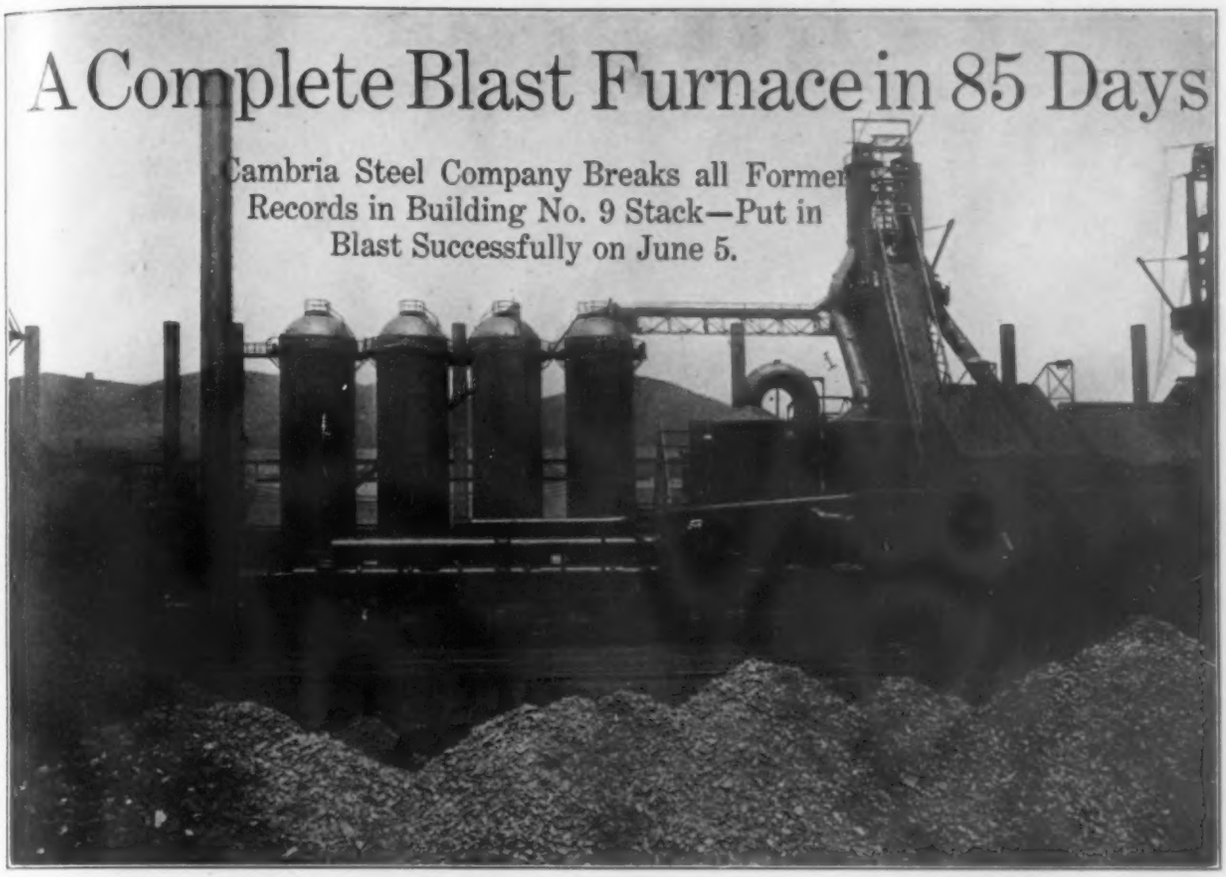
Fig. 3—Indicator Diagrams of Compressors at Various Speeds and Pressures

A general summary of the test results is given in Table 1. The measured volumetric efficiency is shown graphically in Fig. 2 as line B. This diagram also shows the theoretical volumetric efficiency (line A) calculated from the percentage of clearance; the indicated volumetric efficiency (line C), and the volumetric efficiency calculated from the vacuum developed on closed suction (line D). The indicator cards at various speeds and pressures are shown in Fig. 3.

The coincidence of the lines B and D showing the actual measured volumetric efficiency and that calculated from the vacuum on closed suction, notwithstanding the fact the leakage factor as stated above was unusually large, is evidence of the truth of the formula and chart.

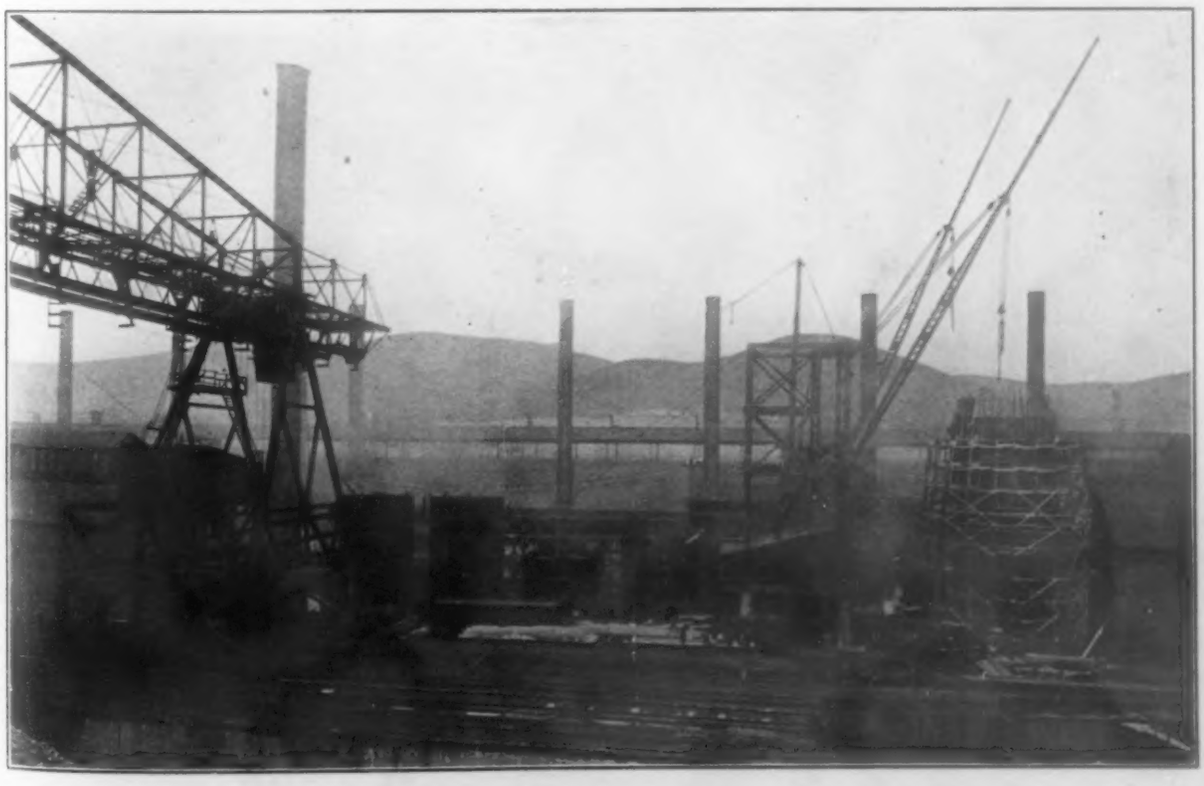
A Complete Blast Furnace in 85 Days

Cambria Steel Company Breaks all Former Records in Building No. 9 Stack—Put in Blast Successfully on June 5.

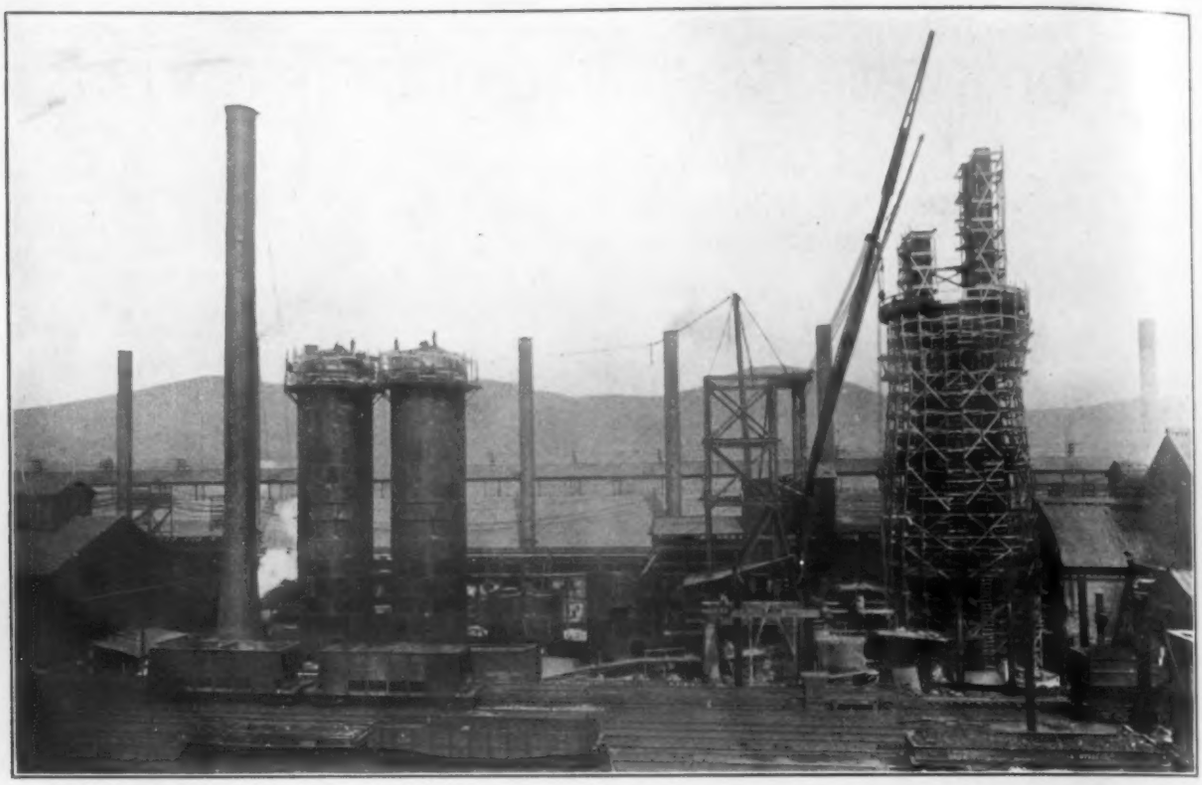


ON page 1401 of THE IRON AGE of June 8 appeared a brief account of the record-breaking feat of the Cambria Steel Company in building complete its No. 9 furnace at Johnstown, Pa., in eighty-five days from the time active work was started. The accompanying illustrations show the progress of the work. Building a complete blast furnace of the largest size in such marvelously short time will no doubt stand as a record for some time and reflects great credit on the engineering and construction forces of the Cambria Company.

The work was instituted at a time when machine shops and foundries had been running night and day with their product sold up for months ahead. There were no plans in existence when the appropriation was made and a new start had to be made with everything. The blowing engine was the first ever built by the Hooven, Owens & Rentschler Com-



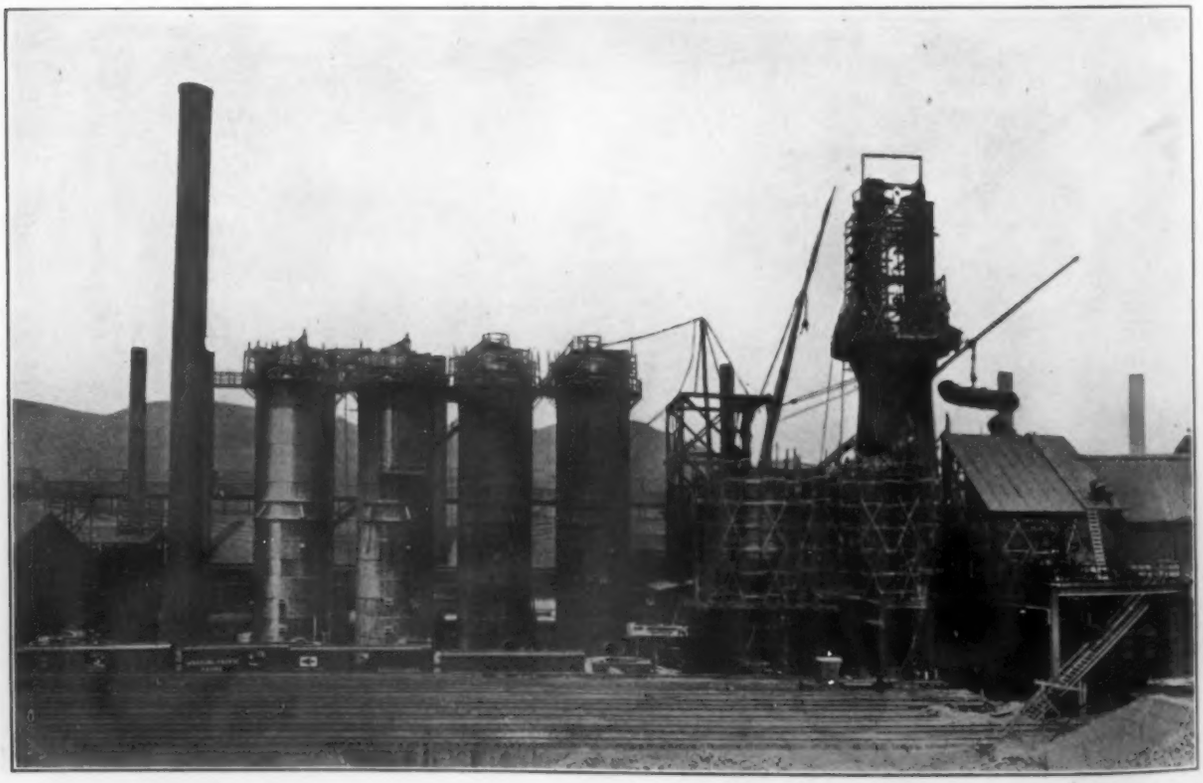
View, taken on April 16, which shows the traveling derrick which was used in the erection work, the four stoves set, stove stack erected and considerable progress made on the furnace



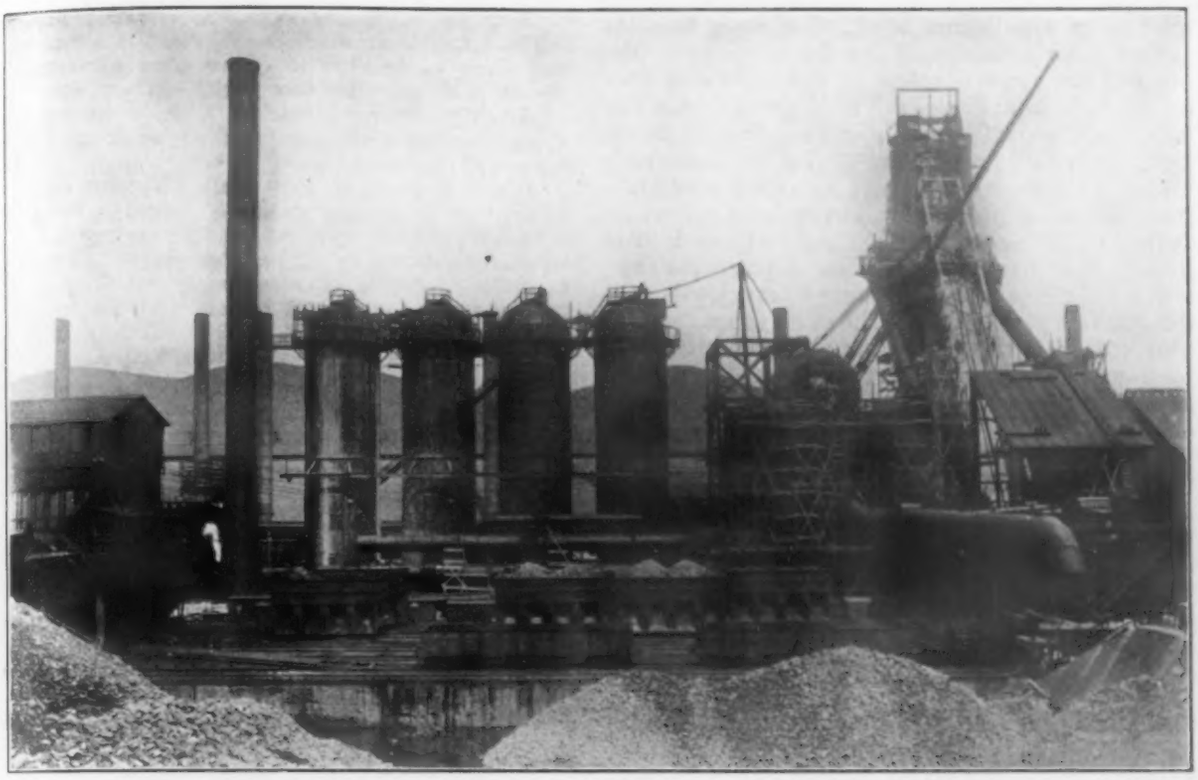
On April 26 two stoves were completed and work begun on the dust catchers and skip house columns

pany, but it was aided by the fact that E. E. Slick, vice-president and general manager of the Cambria Steel Company, designed the air cylinders. Other concerns that furnished equipment in remarkably short time are the Otis Elevator Company, Philadelphia, which built the skip hoist, the Harbison-Walker Refractories Company, Pittsburgh, and the A. J. Haws Brick Company, Johnstown, Pa., the Babcock & Wilcox Company, the Pennsylvania Steel Company, the Southwark Foundry & Machine Company and the Treadwell Engineering Company, which furnished most of the castings. Practically all of the structural steel and the brick work was done by the Cambria Steel Company itself. Two gangs each of about 750 men worked night and day.

The furnace is located at the company's Franklin plant in line with furnaces Nos. 7 and 8. The center of No. 9 stack is 125 ft. from the center of No. 7 stack with cast houses between and in front of the stacks. The four 24 ft. diameter by 100 ft. high stoves for No. 9 furnace are to the right of the stack on 32-ft. centers, and are of standard two-pass, side-combustion type with Slick patent checker brick and improved gas burners. The stack has a rated ca-



On May 12 the four stoves were completely erected, the furnace shell and bleeders were complete, the three 24 x 30-ft. dust catchers were well underway, and the skip engine house was roofed over

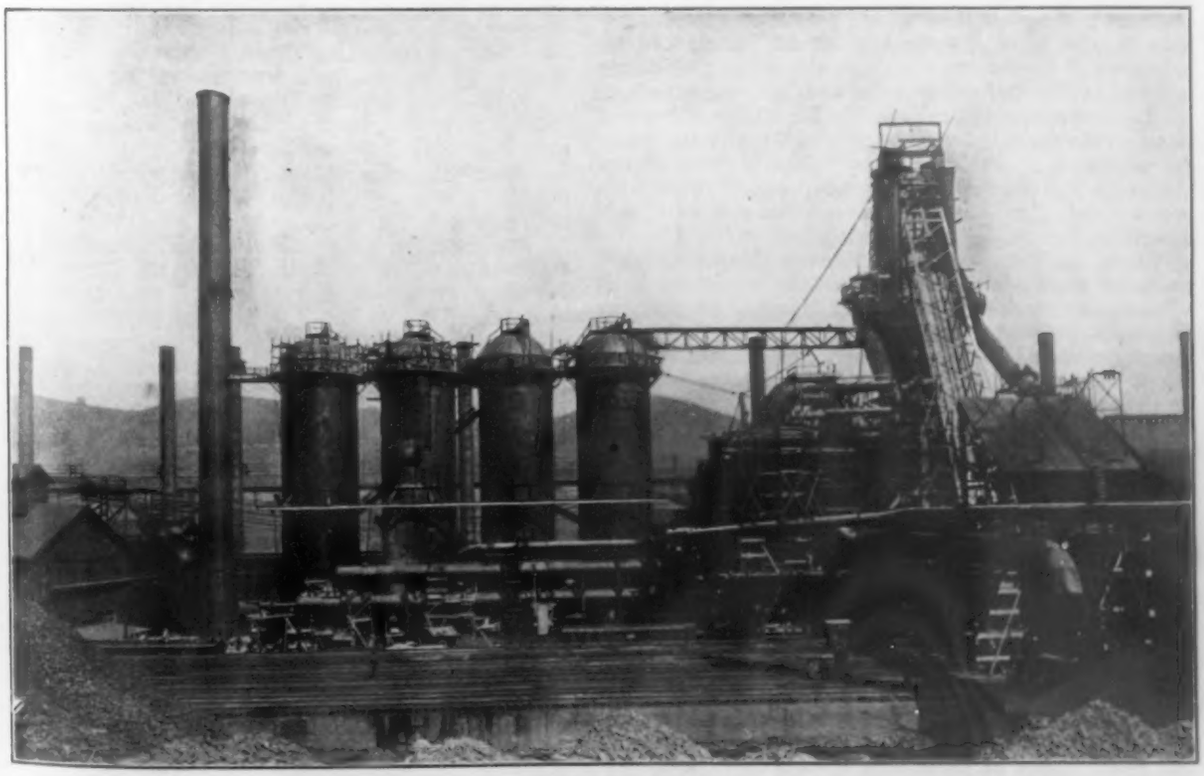


On May 25 the dust catchers, the downcomers, the skip bridge and the gas piping from the third stove to the boiler house were complete

pacity of 500 tons per day, is 90 ft. high and 22 ft. at largest inside diameter. The hearth has a diameter of 17 ft. which gives the bosh an inclination of 78 deg. 14 min. The furnace shell is supported by six structural steel columns and mantle ring, is thick lined and water cooled to within 33 ft. of the top by means of 158 cast-iron cooling plates. The bosh lining is 27 in. thick, is cooled by 131 bronze boxes and has 12 tuyeres.

The top of shell is of the castle type, which carries the charging platform supporting the hopper for a 11-ft. 6-in. bell with receiving hopper and small bell above. The bells are operated through counter-weighted beams by steam cylinders mounted on charging platform. Below the large bell is hung a Slick distributor which has been successfully used on the other furnaces of the company. The top also carries four high bleeders with two cross pipes from which the gas is taken through two downcomers, one to each of two 24-ft. diameter by 30-ft. dust catchers. From these it passes to a third dust catcher of the same size and then to the boilers and stoves without further cleaning.

The furnace is charged by a double skip oper-



On June 1 the blast and gas piping was finished. On June 5 the furnace was ready to be put into blast, as shown at the head of the article

ated by an Otis steam hoist. The stock handling system is an extension of the old equipment. The ore and limestone is taken by gantry cranes from an 800,000-ton storage yard at the rear of the furnaces and loaded into bin cars. These cars in trains of twenty or more are shifted from under the cranes to the stock or warming house and discharged into electric skip charging larries as required by furnaces. The coke is hauled from the coke plant located near the blast furnaces in large bin cars, which discharge through a chute from a lower track directly into skip bucket. The stock house has been provided with additional warming capacity. Extensions were made to boiler house building to take care of twelve 300-hp. B. & W. boilers equipped with superheaters.

The present blowing engine house was extended to accommodate a 48 x 86 x 84 x 60-in. Hoover, Owens & Rentschler blowing engine. In order to secure the prompt delivery required, the air end of this engine was designed by Mr. Slick, and a new style of plate valve which for two years has been successfully tried out by the Cambria Company was incorporated in the design.

ANTI-TIME-STUDY LEGISLATION

Individual Views of Members of Naval Consulting Board and Others

In the movement to prevent legislation by Congress antagonistic to efficiency in Government workshops, different members of the Naval Consulting Board have expressed themselves in letters to the Committee of Ten, which has had charge of the campaign for engineers and other well-wishers of scientific management. From these letters have been made the following extracts:

W. R. Whitney, Schenectady, N. Y.—"Scientific management, so-called, is substantially identical in its economic purpose and net result with the use of automatic machinery. Both aim to reduce the amount and fatigue of manual labor by increasing its efficiency and both in decreasing the cost of production and raising the standard of living. . . . Severe discipline, driving methods and unfair bonuses are characteristics of individuals, not of a system, and cannot be reached by this kind of legislation. . . . In fighting efficiency labor is mistakenly fighting its own best interests."

L. H. Bakeland, Yonkers, N. Y.:—"The bill seems hastily conceived and may be far-reaching in its harmful effects. . . . I have always been in favor of liberal bills for improving the labor condition of this country, but I consider the present instance as a misdirected effort, which may work great mischief."

W. L. R. Emmet, General Electric Company, Schenectady, N. Y.:—"Charity should be exercised individually, not collectively. . . . Legislation such as is proposed by the Tavenner and Van Dyke bills is broadly unsound in principle and can conduce only to stagnation of industry without the possibility of benefit to the average workman."

Hudson Maxim, Landing Post Office, N. J.:—"As a matter of fact, if these measures . . . were to become laws, labor would suffer more than would capital."

Lawrence Addicks, New York:—"Such legislation is undesirable at any time. . . . I do think the scientific management has to be applied with reasonable discretion and understanding. . . .; but there is no reason to deny by statute the existence of these qualities in those in charge of our Government plants."

A. M. Hunt, New York City:—"It requires no very great amount of analysis to bring one to a realizing sense that any such legislation would seriously handicap. . . . I do not see how any member of Congress can favor either of these bills if he acts from proper motives, and not from desire to cater to demagogues and labor agitators."

Matthew B. Sellers:—". . . certainly mistakes the object of these time studies, which is not to make men work harder, but to enable them to accomplish the same results with less work."

Elmer A. Sperry, Brooklyn, N. Y.:—"To my mind these measures if carried into effect would work great harm and injustice."

Frank J. Sprague, New York City:—"I can conceive of no more objectionable or injurious legislation than that proposed, opposing scientific management and efficient operation in shop management. These bills represent the most vicious type of class legislation. . . . The attempt to have them passed as riders of important appropriation bills will indicate the impossibility of their standing alone if considered on their merits."

EXPERIENCE UNDER SCIENTIFIC MANAGEMENT

The human factor under scientific management has been made a subject of investigation by the Committee of Ten, and the following extracts from observations made by a number of employers operating under such management may be added to the information already available:

Louis B. Weber, assistant manager, Lodge & Shipley Machine Tol Company, Cincinnati:—"The system was hard to inaugurate, the men feeling that we would not treat them right, that if they reduced the hours on the work that we would cut the premium allowance. This we have never done. Consequently to-day it would be a serious thing to us if we were to make an attempt to do away with the premiums or bonus system. The men want it as much now as they disliked it fourteen years ago."

C. W. Schwartz, Jr., Smith & Furbush Machine Company, Philadelphia, 75 per cent of whose employees are working on tasks set by time studies: "Our workers are much happier under the system . . . the few men we use from time to time on straight day work are dissatisfied and ask to be put on premium work."

F. F. Beall, vice-president Packard Motor Car Company, Detroit, with 10,400 employees: Seven-eighths of machine workers and assemblers working under bonus or premium and all on tasks set by time study: "We have been requested by the men to set standard times where we had not yet been able to get the work done, and often an employee is dissatisfied because it is not done as fast as he thinks it ought. . . . Average premium is about 27 per cent of the day wages—hours of labor shortened—output has increased, but so has working force—the stop-watch and time study save the employee many unnecessary movements, and thus reduces his physical and mental fatigue."

F. E. Doolittle, superintendent Knox Motors Company, Springfield, Mass.:—"The happiness of the operator is greatly increased—we find the operators to be in better physical condition—average hourly rate under bonus 40 per cent higher than regular day work rating."

Five years' experience with scientific management, from 1910 to 1915, at the Clothcraft Shops of the Joseph & Feiss Company, Cleveland, has, according to a statement from Richard A. Feiss, general manager of the company, showed that the average annual income of all workers has been increased 37 per cent. In the same period the cost of production has shown a slight decrease. As showing the effect of such management on the worker, Mr. Feiss states that the medical and other records of the company show that no one within the last seven years left the employ of the company because of overwork or breakdown. Although 70 per cent of the workers are women, over one-third have been in the steady employ of the company for a period of five years or more. He holds that if time study and scientific management overspeeded the worker, such a showing would be impossible and the labor turnover would show a material increase. His records for the labor turnover are as follows:

Labor Turnover, 1910-1914.

Year	Payroll	New Hands	Per Cent
1910	1,044	1,570	150.3
1911	951	807	84.8
1912	887	663	74.7
1913	874	569	65.1
1914	865	291	33.5

Slag and the Corrosion of Wrought Iron

A contribution to the argument that the resistance of wrought iron to corrosion is due to the presence in it of slag is offered in the accompanying illustrations furnished by the A. M. Byers Company,

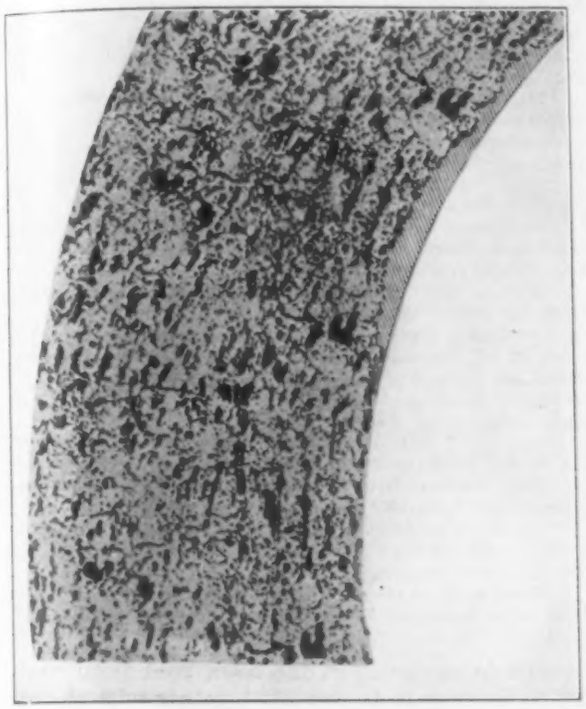


Fig. 1—End Section of Wrought Iron Pipe, Magnified 30 Diameters, Showing Ends of Slag Bands Distributed Throughout the Metal

Pittsburgh. The slag is non-corrosive and almost electrically inert. The protection against the entrance of moisture and oxygen afforded by the 6 per cent slag content of wrought iron is compared with that of the graphite flakes in cast iron.

Fig. 2—Photomicrograph of Longitudinal Section of Wrought Iron, Magnified 75 Diameters. Dark portions are slag bands

The photomicrograph, Fig. 1, is an end view of a section of wrought-iron pipe, the slag appearing black or dark gray and the iron light gray. The rusted area, indicated by the cross lines, represents the starting of a pit, showing how the individual slag streaks at this point form a barrier. This is cited as indicating why wrought iron tends to rust evenly, since the corrosion, proceeding along the lines of least resistance, tends to spread out instead of going deeper. Fig. 2 is a photomicrograph of a longitudinal section of wrought iron, the dark bands showing the slag.

Air Supply for Cupolas

At its last monthly meeting of the season, June 7, the Newark Foundrymen's Association, Newark, N. J., was addressed by J. A. Shorey, of the General Electric Company, on "The Relation of Air Supply to Cupola Blowing." In part, Mr. Shorey said:

The conservation of the heat value of the fuel is directly dependent on a uniform rate of melting, which, in turn, depends on the supply of a definite weight of oxygen delivered to the cupola at a definite and uniform rate, covering not only the period of melting, but each instant of the entire period.

It has generally been accepted that 30,000 cu. ft. of displaced air should be allowed for each ton of iron under ordinary conditions of melting. From computation it has been assumed that 150 cu. ft. of air is required to burn 1 lb. of carbon to CO_2, and in ordinary practice 1 lb. of coke is sufficient to melt 10 lb. of iron. This assumption is made on the basis that coke is pure carbon. Commercial coke analyses vary widely, but a fair average of carbon may be assumed to lie between 85 and 90 per cent, which reduces the air requirement in this proportion. In actual practice 24,000 cu. ft. of free air has been found necessary for the melting of a ton of iron under the assumed ratio of 10 to 1.

The weight of the oxygen contained in a cubic foot of air under normal weather conditions in this part of the country varies widely, as the temperature varies, roughly, from zero in winter to 90 deg. in summer, corresponding to 460 deg. and 550 deg. absolute, a variation of 8 per cent. Again, the weight of a cubic foot of air varies directly as the barometric or absolute pressure. In this latitude the barometer occasionally reaches a point below 28.5 in. and above 30.5 in., which introduces another variable of 9 per cent. If these two percentages are cumulative, that is, with a low barometer and high temperature, the oxygen content by weight of a cubic foot of air may vary widely. It must be realized that imperfect, irregular combustion not only increases the coke ratio, and therefore the cost of coke, but it results in increased losses of the iron itself. Tests have indicated a variable ranging from 5 to 10 per cent of the total iron melted. In other words, in operating a cupola, while the coke is carefully weighed, likewise the iron, the weight of the air, and rate at which it is supplied, which are of equal importance, are left to the judgment of the operator, or to the exigencies of handling the iron, rather than to the over-all economy of melting.

Among the leading Milwaukee manufacturers represented on the annual trade extension excursion of the Merchants and Manufacturers' Association through southern Wisconsin, northern Illinois and eastern Iowa were: A. J. Luedke, Milwaukee Corrugating Company; A. J. Lindemann, A. J. Lindemann-Hoverson Company; A. L. Gebhardt, A. L. Gebhardt Company; John C. Millmann, Stegeman Motor Car Company; F. F. Luedke, John Pritzlaff Hardware Company; William O. Vilter, Vilter Mfg. Company; E. W. Timm, Westinghouse Lamp Company. The trip was made in a special train and lasted one week, June 4 to 10. Moving pictures of Milwaukee factories and business houses were shown at principal stopping points, and great quantities of advertising matter were distributed.

Drop Forging Discussed at Philadelphia

Third Annual Meeting of the American Drop Forge Association Last Week—Commercial But Chiefly Technical Problems Considered

A LIVELY meeting of those interested in drop forging was held in Philadelphia, at the Hotel Adelphia, June 9 and 10. It was the third annual convention of the American Drop Forge Association. It concerned itself chiefly with the technical problems of manufacturing forgings, but the commercial aspect was not inconspicuous. It appears that the organization is made up of individuals or firms making forgings for the market, as under contract, and of those making for their own consumption, as some of the larger automobile companies. While the association has been in existence over two years, with an organizing meeting in Detroit, a convention in Chicago in 1914 and a meeting in Pittsburgh about 15 months ago, it has remained for last week's meeting to put the association among those of the first rank.

Last week's program contained some reference to distinct commercial matters, such as cash discounts, and also to the labor question, but owing to the lateness of the hour on the last session, Saturday morning, consideration of these subjects was postponed. According to the report of the secretary-treasurer, given at the first session, it would appear that of the 200 jobbing and manufacturing forging shops in the country about 50, or 25 per cent, are represented in the membership. It is only proper to state that successful active campaigning for membership increase was obvious at the meeting. The object of the association is "to advance the interests of the drop forge business by careful and concerted study of any financial, scientific, mechanical or human matters pertaining to the trade."

Three sessions were held: Friday morning and Friday afternoon and Saturday morning. For the intervals after sessions elaborate entertainment arrangements had been made, and so fully did a number of the so-called supply houses contribute to this entertainment that representatives of those houses met as the association meeting was coming to a close and formed the Drop Forge Supply Association. In this H. N. Taylor, N. & G. Taylor Company, Philadelphia, and Charles Harmon, Jr., National Machinery Company, Tiffin, Ohio, took a large part. Mr. Taylor was made chairman of the supply men's organization and A. L. Wurster, Heppenstall Forge & Knife Company, The Bourse, Philadelphia, was chosen secretary. These two with one to be selected from the city where the next convention of the association is to be held are to constitute the supply association's executive committee and arrange the details of apportioning the entertainment expenses. A likely contribution of $5 per firm was mentioned with the possibility that an additional charge may be made for more than two representatives from a single firm. Incidentally it is understood that Cleveland is under consideration as the place of meeting for the next convention of the American Drop Forge Association.

THE TECHNICAL PROGRAM

is as follows:

"Selection of Proper Machine for Making Forgings"—R. T. Herdegen, Dominion Stamping & Forging Company, Windsor, Ont.

"Floating Type Head for Board Hammers"—Howard Terhune, Chambersburg Engineering Company, Chambersburg, Pa.

"Multiple Mechanical Die Sinking"—Jules Dierckx, Keller Mechanical Engraving Company, Brooklyn, N. Y.

"Forging of Automobile Front Axles"—J. F. Zwiker, Willys-Overland Company, Toledo, Ohio.

"Heat Treatment of Drop Forgings"—W. C. Peterson, Packard Motor Car Company, Detroit.

"Methods Pursued by Modern Forge Shops in Making Six-Throw Crank Shafts"—A. A. Motherwell, Buick Motor Car Company, Flint, Mich.

"Manufacture of Drop Forging Steel"—H. N. Taylor, N. & G. Taylor Company, Philadelphia.

"Corrective Work on Forgings by Electric Welding Process"—R. E. Kinkead, Lincoln Electric Welding Company, Cleveland.

"Sand Blasting of Forgings"—W. C. Lytle, the Pangborn Corporation, Hagerstown, Md.

"Sources of Heat for Forging Furnaces"—A. A. Holbeck, the Bonnot Company, Canton, Ohio.

"The Hammer Hour Overhead System"—A. A. Motherwell, Buick Motor Car Company, Flint, Mich.

"Recent Developments in the Use of Upsetters with Reference to Finished Gear Forgings"—F. O. Andrews, Acme Machinery Company, Cleveland.

"The Practical Use of the Pyrometer, with Practical Demonstration in the Manufacture of Forgings"—C. R. Cary, Leeds & Northrup Company, Philadelphia.

The papers were in the main read from manuscript and are to be printed together with the discussions in the *American Drop Forger*, published by E. B. Horne, the secretary-treasurer of the association, and identified with the Packard Motor Car Company, Detroit. Subjoined is given an account of the main points of the papers and the discussions.

OFFICERS FOR ENSUING YEAR

The meeting was opened with an address of welcome by Howard B. French, president Philadelphia Chamber of Commerce, and by E. J. Cattell, statistician of the city, followed by an address by F. A. Ingalls, Ingalls-Shepard Forging Company, Harvey, Ill., the president of the association. The convention was brought to a close with the election of officers for next year as follows:

President, Robert T. Herdegen, Dominion Forging & Stamping Company, Walkerville, Ont.

Vice-president, T. W. Siemon, Union Switch & Signal Company, Swissvale, Pa.

Secretary and treasurer, E. B. Horne, Packard Motor Car Company, Detroit (re-elected).

Directors: George Desautels, Imperial Drop Forge Company, Indianapolis; J. F. Zwiker, Willys-Overland Company, Toledo, Ohio; S. H. Carpenter, general manager, Atlas Drop Forging Company, Lansing, Mich.; E. J. Frost, Frost Gear & Forge Company, Jackson, Mich., and F. A. Ingalls, the retiring president.

Mr. French, in his address of welcome, made a plea that the business man interest himself far more than he does to-day in politics, particularly to the extent of working in person in the halls of legislation. The business man should insist, he said, that the Government remain an executive and not become a manufacturer.

EASTERN MANUFACTURERS AND THE EUROPEAN DEMAND

The burden of Mr. Cattell's remarks was that Eastern manufacturing cities and, in particular, Philadelphia, are advantageously located for business with Europe and that the warring nations are far from being bankrupted. He emphasized that

many economies are being practiced abroad, that much of the money waste is being offset by the saving of lives through surgery and otherwise, and that it must be remembered that prior to the war France had a daily income of $1,000,000 on investments outside of the country and England a similar income of $2,000,000 a day. He told how different markets had passed from Philadelphia to Western cities to bring maker and consumer that much closer together, but Russia and the Balkans were substantially virgin territory and are coming to America for the next ten years and Philadelphia is 800 miles nearer the buying market than the Western cities, and in addition the city has a good labor market and in general has the basis of a manufacturing capacity which it expects to hold. He told of a number of the large municipal projects under way by Philadelphia, including its series of 300 x 1200-ft. docks shortly to be built.

PRESIDENT INGALLS ON THE STEEL SITUATION

President Ingalls expressed regret that steel manufacturers marked steel so high. He told how in his own case, with 1000 tons monthly capacity and with specifications on material five and six months in advance of delivery, it had become necessary to accumulate a working stock of 4000 to 5000 tons. He agreed that there is an enormous business offering for an uncertain length of time, but the dark cloud which menaced the situation is the possibility of a slumping steel market. He held that when steel mills are so busy making munitions that they cannot make steel for the plowmaker, we are not in a good economic situation. He outlined briefly some of the advantages of co-operation through the association, such as becoming acquainted with one another so that different commercial questions may be better appreciated or economies in manufacture effected through the numerous suggestions developing in a meeting. While the automobile has made the drop forging business, as some assert, the development of drop forging, he said, has made the automobile.

OFFER OF SERVICES TO GOVERNMENT FOR DEFENSE

Later on in the meeting the following resolution was unanimously passed, as the attitude of representatives of makers of hammered steel products:

> We, the members of the American Drop Forge Association, hold ourselves in constant readiness at all times to serve this country with our trade knowledge, our equipment and our men for any necessary military, defensive action that our Government may require from us. We also declare that we are in favor of all unselfish efforts toward such military and industrial preparedness as will serve to provide an adequate safeguard against attack by any enemy.

The abstract of papers and discussions follows:

PROPER MACHINES FOR DIFFERENT FORGINGS

Mr. Herdegen's paper on the selection of proper machines for making forgings is in part as follows:

The cost of a forging may be greater or less, according to the type of machine selected for making it. In considering the cost of a forging material, direct labor, overhead must be considered.

Material is considered from the standpoint of the gross weight of steel required to make a certain forging. Direct labor is the actual productive labor work on the forging, consisting in every case of the forger himself, and in some instances of the heater, trimmer man, and grinder, where these are required. The general items of overhead we will consider to vary directly as the productive labor. These general items comprise: insurance and taxes, office expenses, sales expense, interest and discount, etc. These items do not vary with the unit used except as this unit might affect the actual productive labor. The cost of heating, steam or electric power, depends upon the unit used. The life of dies is much influenced by the type of machine. The upkeep of the different machines also varies greatly as do the number and value of the repair parts which must from time to time be purchased.

The following table shows the influence that the type of machine selected has on the cost of a flange or disc forging, whose weight is about 4 lb. The last column shows the relative weight of steel required by the three machines, that required by the steam hammer being taken 100 per cent.

Type of Machine	Relative Production	No. of Men Required	Weight of Steel Used Per Cent
Board hammer	70	2	100
Steam hammer	90	2	100
Upsetter	140	3	75

From the standpoint of production the steam hammer is but little better than the board hammer. Inasmuch as a board hammer man is cheaper than a steam hammer operator, from the standpoint of productive labor a board hammer and a steam hammer are about on a par in this instance. The overhead in the case of a board hammer is, however, materially lower from a purely operating standpoint. The cost of power used, the upkeep and repairs of a board hammer are usually less than the corresponding items for the steam hammer. In most instances, also, the life of the dies is greater in a board hammer than in a steam hammer. If a man had no upsetter in his plant it, therefore, would be most economical to make these forgings on a board hammer.

With the upsetter, although an extra heater is required, the production is double that of the board hammer. Hence, from the standpoint of productive labor, the upsetter is more desirable than either of the other units for this particular work. The 25 per cent saving in weight of metal used further indicates that the proper machine for this work is the upsetter. Actual costs have not been given because rates vary in different localities. It is more a question of the number of men required rather than their actual cost. In some shops it is possible to get an upsetter man cheaper than a steam hammer man; in other shops this is not so. Overhead varies greatly in different localities. The value of the weight saving depends entirely upon the price of the steel used for this work. This saving in weight must then be compared with the labor and overhead costs. In the writer's plant the net saving accomplished by running this work in an upsetter is about 20 per cent.

Another piece of interest from a cost standpoint is a transmission gear, weighing about 2 lb.

Machine	Men Used	Production Per Man	Gross Weight, Per Cent
Steam	2	100	100
Upsetter	3	160	73

The improvement in production effected by the upsetter is not so great as in the previous instance, and it is doubtful which unit would be the better. If the cost of the upsetter men were low it is evident that would be the proper unit, particularly if an expensive steel was used for the article. The die costs would probably be lower in the case of the upsetter, so that in most shops it would probably pay to do this work in this unit.

The different die costs in connection with this work are tabulated below:

	Steam and Board Dies	Upsetter Dies
Size of blocks, in.	9 x 9 x 11	6 x 12 x 14
Material cost	$39.00	$76.05
Labor	18.75	24.00
Overhead, 100 per cent	18.75	24.00
Total cost	$76.50	$124.05
Number of forgings	6,000	25,000
Die cost per hundred forgings	$1.28	$0.496

The effect of die costs is further illustrated by the results obtained in connection with three small transmission gears, weighing about 2 lb. each. These forgings were formerly made in the steam hammer, but are now made in a board hammer. The labor costs are practically identical for the two hammers, but the die costs per 1000 pieces differed as follows:

Pieces Made	*Steam Hammer* Total Die Labor	Die Labor per 1000 Pieces
41,769	258.92	6.20
39,922	261.25	6.53
37,301	229.11	6.15
	Board Hammer	
78,427	197.79	2.50
72,641	169.95	2.30
80,914	159.45	2.00

There are some articles which most every forge man will admit are best made on a steam hammer and it is useless to go into discussion of such parts. The writer had some very interesting results on a fender iron, weighing about 1½ lb. We found that whereas a man could make about 130 an hour on a steam hammer, he could not make much more than 100 an hour on a board hammer. It is probable that the steam hammer was a better unit for this piece, but if board hammer men's wages were low in a particular locality it would pay to make these parts there on a board hammer.

Some good words were said in the discussion for the upsetter and Mr. Zwiker, of the Willys-Overland Company, spoke of increasing production in the case of one article 100 to 150 per cent over that of the drop hammer. It was also brought out that while not always so accurate, it was economical in the use of material, a part punched from the center of a piece sometimes being driven back toward the outside of the piece leaving of a bar fed into the machine only the small bit at the end, which was not formed into the product of the machine.

BOARD HAMMERS

Mr. Terhune, in his paper, referred briefly to the construction of the board drop hammers made by the Chambersburg Engineering Company, and emphasized that one should never use the board hammer where there is a lot of breaking down to be done or there is heavy drawing work. The machine is described in the company's bulletin No. 61-B, which is built with rams running as high as 2500 lb. He suggested that for the big field well covered by the board drop hammer a weight of 1500 lb. for the falling ram represented about the dividing line, but he spoke of the manufacture of 8-in. shell bases on a 1200-lb. die with a 1600-lb. falling weight; some 350 were turned out in a night shift and as many in the day time, but 15 blows were necessary to finish and generally he did not regard the equipment as advisable. As regards power rating he said a drop hammer called for 1 hp. per 100 lb. falling weight, but emphasized that when there is much breaking down to be done the machine has to pull the weight from the work, while where there is a rebound such effort on the part of the motive power is unnecessary.

MECHANICAL DIE SINKING

The paper by Mr. Dierckx was read by S. A. Keller of the Keller Mechanical Engraving Company, and was devoted to the automatic profiling machine built by the company for die sinking. It is substantially an automatic milling machine, but also has a hand feed, and the die is cut according to a pattern which is followed by a tracing part of the machine. Mr. Keller emphasized how 50 die makers or die sinkers are needed now where one sufficed a few years ago, and yet there is no available supply nor efforts to devlop die sinkers to meet the demand. One man, he said, can operate a number of the Keller machines, and the machine owns the field of die sinking except where the die is of a nature allowing it to be made largely on a lathe. Cost, he emphasized, is not by any means a leading feature, but the main thing is that a die may be cut as and when wanted. The more elaborate the die and the more expensive it is as made by the general present-day methods, the more advantage there is in the machine method. The largest dies thus sunk up to date measure 23 x 16 in. Sometimes as a pattern for the machine an existing forging is available.

FORGING AUTOMOBILE AXLES AND CRANKSHAFTS

Mr. Zwiker described in general terms and briefly the forging of automobile front axles and showed two examples of other difficult forging work. He referred also to the shaping of what corresponds to a flange finished to 7½ or 8 in. diameter and a thickness of 5/16 in. from a length of 15 or 16 in. of 1¼ in. round alloy steel stock. This was done in seven operations with one heating and one reheating, on a 4 in. and 5 in. upsetting machine, one for gathering the stock and one for bringing it home. In the upsetting of axles some 16 tons are put through in a day and 300 axles weighing 39 lb. are produced from 1⅝ in. square stock with 20 per cent waste.

Mr. Motherwell described the development of the present methods pursued in the Buick Motor shops for forging six-throw crankshafts. His productin is now 600 in 22 hr.; the cost per crankshaft quoted by an outside forging concern was $9.85; his inside cost has now been reduced to $2.68, in spite of the higher prices of steel. He considers a 12,000-lb. hammer necessary for increased production, which he expects to bring to 750 crankshafts from one hammer.

MANUFACTURE OF DROP FORGING STEEL

In his paper on "Manufacture of Drop Forging Steel," Mr. Taylor spoke without notes, in part as follows:

The Cumberland plant of the N. & G. Taylor Company is operated solely for steel of drop forging quality with an output of 3000 tons per month. Care is taken to prevent slivers, so-called, and seams and pipe. Pipes are avoided by using 25-ton open-hearth furnaces with a selective charge of basic high grade scrap, old rails, railroad couplers, steel wheels, crop end of blooms, rejected forgings, etc. With such a careful selection, a denser steel free from traces of oxide is obtained and a quieter metal in pouring than otherwise. The metal is cast in 750-lb. ingots of 10 x 10 in. cross section, with bottom pouring in groups, with the result that it is rare to find a depression in the ingots on cooling.

Seams in bars are caused in three principal ways. An ingot may be defective because of small blow-holes close to the surface of the steel. A cross-section of such an ingot shows these subcutaneous blow-holes with their axes radial toward the center. If the skin is thin then reduction in the bar mill causes a break in the skin and the blow-holes open and do not weld. If they break through they appear as slits.

If in the rolling in the bar mill the reduction is too great between passes, fins are formed, and these on the quarter turn given the bar for the succeeding pass are mashed down and form seams in the surface. By increasing the number of passes and thus decreasing the rate of reduction, such defects are prevented. In a similar way it is unwise to attempt too great reduction in the first few passes of the ingot, otherwise the surface of the ingot is torn and takes on irregular breaks where the friction of the rolls has caused cracks which do not weld readily after exposure to the air.

He said that the company holds to a narrow range of 0.05 to 0.50 per cent carbon and in spite of the bottom pouring arrangement cuts 10 per cent from the bottom of the ingot and 25 per cent from the upper end. The company has a big outlet for the crop ends, particularly in 1½ in. size for stirring rods. He described the break-down passes as barely more than pressure passes. In the brief discussion following, it was pointed out that rarely in the steel rolling process would it be possible to realize a welding temperature, if the effort were made to eradicate blow-holes through a welding process.

ELECTRIC WELDING FOR CORRECTING FORGINGS

The paper on the electric welding process for correcting forgings brought out that the process is largely of value to improve the appearance of forgings where such is of commercial importance but is not something which should be used to improve the strength of forgings. In the latter sense it is not chargeable with the local over-heating likely to result as with the use of the gas flame. Mr. Kinkead, the author, emphasized that the metal filled in on some low spot, for example, is in the nature of cast steel. One inference he made is that by the electric process one might apply extra metal to say a depth of 1/16 in. leaving such a small excess to be ground off in the finishing. With the electric machine no pre-heating of the forging is necessary and an unskilled man can do the work.

The author also emphasized that the use of the process, though new, is not to be regarded as immoral, and that one should not have to go through the experience that followed welding of steel castings a few years ago, when the work was done in the dead of night or behind tightly locked doors. Besides briefly

extolling the merits of the electric process as compared with the gas flame method, he spoke of the lower operating costs and the greater volume of work which may be done by it. He placed the oxy-acetylene equipment as likely to cost about $200 in first cost against $750 to $900 for the electric equipment, depending in part on the cost of the power supply, but he said that save for three concerns in this country, one such equipment with one operator would suffice for any of the drop forging plants of the country.

SAND BLASTING OF FORGINGS

The paper by W. C. Lytle on the sand blasting of forgings brought out quite a discussion. The author described the desirability of sand blasting as against pickling and referred at some length to mechanical sand blasting machines, such as the barrel and table types in the Packard automobile plant. He referred also to the sand blasting of alloy steel forgings, which have a hard scale and the sand blasting of forgings after heat treatment and carbonizing and of forgings in preparation for painting or plating.

J. E. Williams, Washington Steel & Ordnance Company, Washington, D. C., on the basis of an experience with two sand blasting apparatus, regarded sand blasting for forgings as a decided advance, as it will allow the forging manufacturer to get a better price and is an ally in showing up the defects and in this way helps the inspection department. It was also brought out that in the case of some sand blasted gears, it was some months before rust appeared.

Charles H. Franklin, General Electric Company, Schenectady, told how sand blasting has been superseded by blasting with chilled steel pin-head-size shot for preparing malleable castings for sherardizing and for cleaning forgings. No dust results and the shot is used over and over again until so small that it drops into the receptacle or mud drum so-called together with the oxide removed. He emphasized that the corners of forgings are saved in such a process while a tumbling barrel will mill off the sharper edges. Only 15 min. treatment is necessary in the shot blast, while hours are required in the ordinary tumbling barrel, and this is an important factor where time is a consideration.

J. B. Welch, Remington Arms-Union Metallic Cartridge Company, Bridgeport, Conn., mentioned satisfactory performance with six New Haven combined sand blast and tumbling barrels in use in his plant in which 1500 lb. of forgings are finished in 30 min. The barrels are installed in the trimming shop and are operated in three shifts and there is no complaint of dust. A satin finish is obtained, as in the case of bayonets. With hand operated sand blasting equipment, dust escapes from the openings.

Mr. Motherwell, while admitting that the sand blasting will show defects, contended that one could find out the trouble in advance, and accordingly in the Buick plant heavy wire foundry brushes are used to knock off as much of the scale as possible. Some 85 to 100 tons of the smaller forgings are passed through a 1000-lb. barrel per day, but for the 900 to 1100 axles and the 600 crankshafts three pickling tubs are used.

POWDERED COAL FOR FORGING FURNACES

Mr. Holbeck described his system of burning pulverized coal in an actual installation, which appeared to be that in the Middletown, Pa., plant of the Standard Steel Car Company. It was installed by the Bonnot Company, Canton, Ohio, with which company Mr. Holbeck is identified. He told how he got interested in utilizing powdered coal. In a certain forge shop when fuel oil was difficult to obtain and a producer gas plant was installed, it was found that it took 10 min. longer than oil to get each heat and that more blows of the hammer were necessary to secure the finished product. Although the fuel cost was less than with the oil, it was not on the whole a paying proposition, and he took up the study of powdered coal.

In the installation described, the distributing pipe main through which the coal dust is carried in suspension in air throughout the works to branch feeding pipes to the various furnaces is 2125 ft. long and contains 37 elbows. It crosses a craneway five times. An exhausting flue connects with the furnaces and with a steel stack so that the gases and products of combustion are taken from the plant. The author showed a type of furnace for forge work with a combustion chamber, in which chamber the powdered coal is converted into a fixed gas after the fashion of a gas producer before it passes over the bridge wall.

He said that from careful tests 10 lb. of pulverized coal are equivalent to 1 gal. of fuel oil, and with pulverized coal costing $3 per ton, the equivalent to fuel oil would require oil at 1½c. per gallon. He considers 75 lb. of coal dust equivalent to 1000 cu. ft. of natural gas or with powdered coal at $3 per ton, it is on a parity with natural gas at 11¼c. per 1000 cu. ft. The furnaces in the plant described consume as low as 10 lb. and as high as 400 lb. of coal per hour and have been operating successfully with a few at night and sometimes as many as 55 in the daytime. As the supply to a furnace is turned on, the additional amount of air admitted into the piping system speeds up a variable coal feeder, so that automatic control of the supply of fuel is realized in accordance with the demand.

He said that in a new brick furnace welds have been made within 20 min. after starting the furnace. No wear is discernible in the distributing system for which No. 16 gage sheet piping is used with cast-iron fittings on the elbows, which take a polish. The plant described cost $35,000, but he said plants can be provided as low as $5,000, depending on the conditions. He placed emphasis on the capacity of powdered coal to secure a quick heating and that it gives nearest the conditions of the blacksmith's forge fire. He said that temperatures as low as 800 to 900 deg. can be maintained, as in muffle-type furnaces.

HEAT-TREATMENT OF DROP FORGINGS

The paper presented by Mr. Peterson summarized the heat-treatment of forgings as follows:

Forgings must not be heated too hot. They should be worked continuously down to the finishing temperature. This finishing temperature should not be too far above the critical range, nor below it. The influence of the heat-treatment of forgings is dependent more or less upon the proper hot working of the forgings.

Collectively these facts tend towards a suggestion which could be worked out to the benefit of both the vendor and consumer of forgings alike. Since quality is the watch-word of the present "up-to-the-minute" manufacturer, and since we know that uniformity is absolutely essential to good forgings, could it not be arranged to standardize more than ever such operations as

Proper working temperatures
Proper finishing temperatures
Number of blows to a forging, etc.

Such standardization would mean increased output and likewise better forgings. In time studying along these lines it might be found that the introduction of motion study would play a very important part in producing more forgings of a very high grade of workmanship.

OVERHEAD IN THE FORGING SHOP

The paper by Mr. Motherwell, entitled "The Hammer Hour Overhead System," was an informal presentation by him of his method of securing an hourly burden rate for each machine or unit of machines. He told of the savings effected in making a careful study of all the charges against production and offered to show visitors to his plant the details of the system. He spoke of the advisability of employing motion pictures to study the methods of the different hammer men as there was something perhaps in the rhythmic actions of some men which helped in production. He keeps an elaborate record of the history of each die, and these records are kept under lock and key, so important are they regarded in his estimating performance and cost. Besides making forgings for the Buick Motor Car Company the company does considerable contract work.

In the discussion some complaint was voiced with regard to the demand for forgings which are substantially equivalent to machined products, which forgings

require dies without draft. Mr. Motherwell felt that the limit should be 1/64 in. plus or minus and he has found that one buyer actually preferred a limit of this kind, as it did not require the utmost accuracy in locating center points, as in preparing the piece for machining.

RAPID FORGING OF A BEVEL GEAR

The paper by Mr. Andrews showed a piece of work which he had succeeded in turning out with one of the machines of the Acme Machinery Company, indicating the possibilities of a forging machine. He made a complete bevel gear from a piece of flat stock. After heating the stock is put in a power press where a slot is cut and the ends rounded. The blank then assumes the form of an oval which is made into a flat ring in a bulldozer. The forging machine receives the flat ring and in three operations forms an internal flange, puts the bevel taper on the gear blank and in the third operation forms the teeth. While gears are not being made commercially at the present time by this forging process, it was suggested in the discussion that perhaps through some such method as this, some of the less-used gears of the automobile differential might thus be made and to that degree of accuracy that little or no machining would be necessary.

C. R. Cary, in the concluding paper of the meeting, gave a demonstration of the reasons why the installation of a pyrometer needs to be carefully supervised in order that the calibration and therefore the readings may be trustworthy.

CASH DISCOUNTS

The program had provided for a discussion on the question of allowing cash discounts, but time did not suffice, and this as well as a proposal to discuss the labor situation were postponed. A. C. Nuth, Whitman & Barnes Mfg. Company, Chicago, had, however, contributed a brief discussion in writing on the matter of cash discounts and from this has been taken the following:

Machinery on which at one time liberal discounts were offered is now sold net. Discount on steel has been changed from time to time until it is now ½ per cent. Die blocks, formerly sold on a basis of 2 per cent for cash in 10 days, are now being sold net. At the last convention of the bolt and rivet people, the discount had been changed to 1 per cent where the buyer formerly enjoyed a discount of 2 per cent.

The most popular term of payment is 30 days net or 2 per cent for cash in 10 days. The seller in making such a quotation is practically borrowing money from the buyer, paying for it at the rate of 2 per cent for an advance payment of 20 days, which is equivalent to 16 per cent per annum. If the seller's financial standing is normal, he can borrow from the banks to conduct his business. Why, then, should the seller pay such an abnormal rate to the buyer for anticipating payment?

Let us suppose that the seller's accounts receivable at the end of a fiscal year is $100,000. He has no way of determining whether his customers will take advantage of the cash discount option and consequently he does not know how much to charge off for discount during the year. Whenever public accountants audit books, they scrutinize the accounts receivable and invariably charge off an amount to cover discounts which might be deducted from settlement of accounts when paid.

A number of manufacturers consider discounts as a reduction in the price of raw material and therefore consider it a part of their cost. When purchasing, the buyer is not in a position to know whether he will take advantage of discounts offered. How then can he accurately determine the cost of his goods?

There is only one real way of doing business and that is to sell at a stipulated price for a definite date of payment. Abolishing discounts would overcome considerable annoyance and ill feeling between buyer and seller. Oftentimes, through oversight, the buyer takes advantage of the cash discount a few days after the option has expired. This of course is resented by the seller, causing considerable correspondence and possibly ill feeling before adjustment is made.

The principal items entering into cost are: Machinery, steel, die blocks, sulphuric acid, fuel oil, coal, labor, burden, etc.

Machinery is purchased at net prices. Steel can be secured at a discount of ½ per cent for anticipated payments, but due to the fact that the drop forger must carry a supply of steel on hand at all times to meet demands, this small discount is hardly sufficient to carry the investment.

Die blocks, sulphuric acid, fuel oil and coal are purchased on 30 days net basis.

Labor is entirely a cash proposition and must be paid every two weeks.

All items entering into burden or overhead expenses are on a net basis.

Thus the drop forger has no advantages in discounts on goods entering into the cost. Let the association make a resolution to abolish discounts.

ENTERTAINMENT

On the side of entertainment, the association tendered to members and guests from its treasury a dinner on Friday evening, but otherwise the entertainment features were in charge of those identified with the supply end of the drop forging industry. The entertainment was in charge of a committee, of which H. N. Taylor was chairman, and automobile trips and sight-seeing excursions, with special arrangements for the visiting ladies, were provided. On Friday noon a luncheon was given by the National Machinery Company, Tiffin, Ohio; on Friday evening a theater party by the Heppenstall Forge & Knife Company, Pittsburgh; a buffet supper following the theater by the N. & G. Taylor Company, Philadelphia; on Saturday a luncheon by the American Shop Equipment Company, Chicago, and on Saturday afternoon tickets to the National League baseball game were distributed by the Chambersburg Engineering Company. The entertainment schedule provided for spending Sunday at Atlantic City, N. J.

The attendance, in addition to those who have already been mentioned in the foregoing report, was in part as follows:

PARTIAL LIST OF THOSE IN ATTENDANCE

L. T. Holdsworth, Sheldon Axle Company, Wilkes-Barre, Pa.

J. G. Lesh, Railway Materials Company, Philadelphia.

Oberlin Smith and Henry A. Janvier, Ferracute Machine Company, Bridgeton, N. J.

S. C. Dalbey and J. M. Clem, Ohio Forge Company, Cleveland.

George H. Derbyshire, Chambersburg Engineering Company, Chambersburg, Pa.

Edward J. Frost, Frost Gear & Forge Company, Jackson, Mich.

D. J. Crowley, E. S. Davis, H. P. McCann and J. B. White, American Shop Equipment Company, Chicago.

Edwin Hodge, Jr., Pittsburgh Knife & Forge Company, Pittsburgh.

F. J. Vichek and Charles E. Hathaway, Vichek Tool Company, Cleveland.

James Rohde, Maxwell Motor Company, New Castle, Ind.

C. B. Smith, Columbia Hardware Company, Cleveland.

A. MacInnes and Maxwell Brace, Hammond Steel & Forging Company, Syracuse, N. Y.

A. F. Zwiker, National Supply Company, Toledo, Ohio.

F. H. Blakeslee and H. D. Heman, Ajax Mfg. Company, Cleveland.

Isaac Cornwell, T. O. Van Alen and E. W. Cornwell, Keystone Forging Company, Northumberland, Pa.

A. A. Kraeuter, Kraeuter Company, Inc., Newark, N. J.

Joseph G. Simcock, Girard College, Philadelphia.

H. H. Keeports, Anderson Forge & Machine Company, Detroit.

F. Aisenault, Locomobile Company, Bridgeport, Conn.

A. N. Bates, Erie Foundry Company, Erie, Pa.

G. C. Soule, Marine Hardware Equipment Company, South Portland, Me.

R. F. Bowtell, Heppenstall Forge Company, Bridgeport, Conn.

Eliot Armstrong, William Breeden, Paul H. Driscoll, Edward Damal and H. G. Meadows, Lackawanna Steel Company, Buffalo, N. Y.

E. H. Graham, Heppenstall Forge & Knife Company, Pittsburgh.

J. P. Harrington, Harrington Machine Company, Erie, Pa.

W. L. Goodrich, Springfield, Mass.

George Hoeffle, Railway Materials Company, Chicago.
Charles S. Lindsay, Heppenstall Forge & Knife Company, Bridgeport, Conn.
J. J. Roche, Remington Arms Company, Eddystone, Pa.
M. F. Maloney, American Locomotive Company, Schenectady, N. Y.
James L. Scanlin and Maxwell Meyers, Newton Machine Tool Works, Inc., Philadelphia.
C. H. Pond, Scranton Forging Company, Scranton, Pa.
J. S. Tierney, American Shop Equipment Company, Brooklyn, N. Y.
Fred M. Wertz, American Steel Foundries, Chester, Pa.
H. Terhune, Chambersburg Engineering Company, Chambersburg, Pa.
William E. Crocombe, Ajax Forge Company, Chicago.
A. Schaeffer, Central Steel Company, Massillon, Ohio.
E. L. Goodin, Canton Drop Forging Company, Canton, Ohio.
Jerome Strauss, J. A. Rendle and L. H. Seiberling, Western Drop Forge Company, Marion, Ind.
C. F. Schunk, Heppenstall Forge & Knife Company, Detroit.
H. M. Parker, Endicott Forging & Mfg. Company, Endicott, N. Y.
George H. Merrill, Merrill Brothers, Maspeth, N. Y.
W. E. Renner, Williams, White & Co., Moline, Ill.
C. A. Brauchler, Canton, Ohio.
F. V. McMullin, Pennsylvania Forge Company, Philadelphia.
S. G. Barker, E. W. Bliss Company, Brooklyn, N. Y.
C. W. Heppenstall, W. B. Lewis, Heppenstall Forge & Knife Company, Pittsburgh.
Gustav Falleen, Rockford Drop Forge Company, Rockford, Ill.
J. F. Connelly, Champion Machine & Forging Company, Cleveland.
Joseph T. Somers, Columbia Steel & Shafting Company, Pittsburgh.
K. L. Ernst, National Machinery Company, Tiffin, Ohio.
George W. Hubbard, Dominion Forging & Stamping Company, Walkerville, Ont.
J. L. Root, Bordentown Forging & Machine Company, Bordentown, N. J.
C. O. Rowe, Union Drawn Steel Company, Beaver Falls, Pa.
J. L. Hoffman, Columbus Bolt Works, Columbus, Ohio.
W. G. Parsons, E. H. Wray, Niles-Bement-Pond Company, Philadelphia.
A. Merzbacher, J. M. Lulley and Henry Whittaker, Henry Disston & Sons Company, Philadelphia.
George M. Bodin, Frank C. Meyer and George K. Crozer, Jr., Keystone Drop Forge Works, Chester, Pa.
Frank W. Trabold, William Prindiville and Carl Swanborn, J. H. Williams & Co., Brooklyn, N. Y.
E. A. Platt, Tabor Mfg. Company, Philadelphia.
W. F. Scully, Gilbert & Barker Mfg. Company, Springfield, Mass.
William McKinley, Republic Iron & Steel Company, Philadelphia.
John Nazel, Nazel Engineering Works, Philadelphia.

The 72-in. reflecting telescope which has been built by the Warner & Swasey Company, Cleveland, Ohio, for the Dominion Astronomical Observatory at Victoria, B. C., is described and illustrated in a little pamphlet which can undoubtedly be had on application to the company. Because of the size of the telescope, difficult and interesting engineering and mechanical problems were involved. The telescope weighs 55 lb., and the revolving dome, 66 ft. in diameter, weighs 120 tons.

The Struthers Furnace Company, Struthers, Ohio, expects to blow in its blast furnace early in July. With improvements under way, this will be made a thoroughly up-to-date plant, and its capacity will be increased from a rated production of 450 tons to about 550 tons a day. In addition to relining, the bosh is being enlarged to 20 ft. 6 in.; the hearth to 16 ft. 9 in.; a Brassert & Bacon gas washer is being installed, a stand pipe is being erected, new gas mains are being put in and a machine shop is being provided.

The Gerson Paper Stock & Metal Company, Modena, Pa., has been incorporated with a capital stock of $50,000 by Samuel Gerson, Coatesville; M. Byron Megargee, Wyncotte, Pa., and Milton F. Glessner, Modena, Pa., to deal in scrap.

Boiler Manufacturers' Program

An interesting program has been prepared for the annual meeting of the American Boiler Manufacturers' Association which will be held at the Hollenden Hotel, Cleveland, Ohio, June 19 and 20. At the opening session Thomas E. Durban, chairman of the committee, Erie, Pa., will present a report on uniform State legislation for boiler construction. At the afternoon session of the same day memorial exercises will be held as a tribute to the late J. D. Farasey, secretary of the association up to his death a few months ago; an address will be given by President W. C. Connelly, and various reports will be presented. This session will also include a technical paper on the effect of sulphur on steel by Dr. J. F. Unger, of the research department of the Carnegie Steel Company and the showing in moving pictures by the National Tube Company, of the manufacturing processes in making steel pipe from the ore to the finished product. In the forenoon of June 20 an executive session will be held for the members only, when the officers will make their reports and C. V. Kellogg, vice-president, will deliver an address. At the closing session on June 20 D. J. Champion, Champion Rivet Company, Cleveland, will read a paper on "Fair Recompense" and the subjects of standardization of nozzles for water-tube boilers, correct labor costs and standard forms of contract will be discussed. The meeting will close with a banquet that evening.

New Work at Cambria Steel Plant

On Monday, June 12, the Cambria Steel Company started work on the building of two more 80-ton open-hearth furnaces at its Franklin works. This plant now has nineteen basic and one acid furnace, while the Cambria works has seven basic and one acid furnaces. The addition of the two new furnaces will give the company a total of thirty open-hearth furnaces.

The Cambria Steel Company is considering building a car wheel plant at Johnstown, Pa. The Midvale Steel & Ordnance Company, through the Midvale Steel Company, Nicetown, Philadelphia, has a rolled wheel shop, and it may be that some of this equipment will be transferred to Johnstown. It is believed that wheel making will ultimately be done only at Cambria.

Sheet and Tin-Plate Wage Conference

Representatives of the Amalgamated Association of America and of the sheet and tin-plate manufacturers opened a wage conference at Atlantic City, N. J., on Monday, June 12. An increase of from 10 to 15 per cent is demanded by the men, while the employers declare they have already granted wage increases commensurate with the advance in the price of their products.

The Court of Appeals of Kentucky has upheld the validity of the Workmen's compensation law, to become effective Aug. 1. The same court held the previous act unconstitutional. The law is practically compulsory, since it deprives employers and employees who do not accept its terms of important common law defenses. There is no State fund created, but rates and indemnities are specified and commercial companies or mutual organizations will carry the insurance.

The Steel Company of Canada, Hamilton, will shortly complete the installation of its three new open-hearth furnaces and its presses for the manufacture of 8 and 9.2-in. shells. The three new furnaces will increase the output of steel by 300 tons per day, or about 33 1/3 per cent. The company is also making further extensions, involving an expenditure of $1,000,000 the present year. It has enough orders to keep its plant working at full capacity until well into 1917.

The Baush Machine Tool Company, manufacturer of worm gears, drilling machines, etc., Springfield, Mass., has opened an office to be permanently located in Detroit, quarters having been secured in the Dime Bank Building. W. Wetsel, who has been associated with the company for some time, and is thoroughly conversant with all its lines, including worm gears for automobiles, will be in charge of the office.

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THE IRON AGE

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Ferromanganese and Substitutes

When the European war broke out, pessimism prevailed in the American steel industry over the future supply of ferromanganese. Dependent as we were and still are on imports of the British alloy and on foreign supplies of manganese ore, the situation was disturbing. Our review of the conditions last January, however, showed that our domestic output had grown so that the apparent supply was not alarmingly below the apparent consumption, allowing for economies and substitutes. Our analysis of the present general situation on another page reveals a continuance of this reassuring condition, the domestic output of manganese-iron alloys being greater than ever in the history of the industry. The present status is by no means as pessimistic as it was earlier in the war.

Taking our present steel output at 44,000,000 tons per year, our apparent consumption of 80-per cent ferromanganese for 1916 is about 298,000 tons, or 24,800 tons per month. To meet this demand our present rate of ferromanganese production, together with our imports, makes an available supply of 271,000 tons, or about 22,500 tons per month. Our import rate has increased 40 per cent over that of 1915, unexpected six months ago; our ferromanganese output advanced 32 per cent and our spiegeleisen production 43 per cent. This is an apparent deficit of but 2300 tons per month. In view of prevailing conditions, this is a state of affairs not only remarkable but entirely unexpected a year ago.

The extent to which economies in the use of and substitutes for 80-per cent ferromanganese are a factor in the total consumption is an important consideration. It is undoubtedly true that they are great enough to more than make up for the apparent deficiency estimated above. That spiegeleisen, 20 per cent, is being used extensively in conjunction with ferromanganese as a partial substitute is apparent from the large increase in output, the great demand for it and the advance in its price. It is also reported that some of this alloy has been converted by resmelting to a higher manganese, lower carbon, alloy for use in steel.

Partial deoxidation of the steel by 50 per cent ferrosilicon, with a consequent smaller amount of ferromanganese necessary, is also being practised. The extent of this substitution is of course limited, but it is said to have been in some cases as much as 25 per cent. Many of the steel makers, especially steel foundries, have been offered a silicon-aluminum-titanium alloy as a panacea for the scarcity and high price of manganese, but the extent or success of its use is not known. Manganese alloys containing more than 20 and less than 70 per cent manganese have also been successful factors as a substitute for the standard alloy.

The use of calcium or magnesium alloyed with other carrying elements has been tried as a partial deoxidizer and substitute for manganese, but it is not likely that these have been very important factors. Their use in Germany has probably been more extensive and necessary than in this country. The effect of these forced economies and substitutes on the future consumption of standard ferromanganese is worthy of consideration when normal conditions again prevail.

Economy in the use of the alloy and care in the making of steel so as to need less manganese, together with the substitutes and expedients suggested, have helped to neutralize the apparent deficiency in the supply. While the present situation is full of encouragement and reflects great credit on American skill in meeting an emergency, it is not without its future peril. We are still dependent on foreign sources for the mainstay—manganese ore.

Iron-Ore Supplies and Needs

The Geological Survey's report on iron-ore production in 1915, given in detail in THE IRON AGE last week, shows that the Lake Superior region mined 46,944,254 tons and the remainder of the United States 8,582,236 tons, making a total of 55,526,490 tons. It may be of interest to make an estimate of the requirements in the event of a 40,000,000-ton pig-iron production rate being maintained. That round figure is a convenient one to take, and a safe one, seeing that production in February fell short 1.86 per cent of that rate, March falling 0.77 per cent below, April 0.84 per cent and May 0.37 per cent, so that no material divergence from such a rate is to be expected while the industry is active, until many more blast furnaces are built.

There are various means of arriving at an esti-

mate of the iron-ore requirements of the industry when production is at a given rate. One that appears amply accurate for the purpose is to take pig-iron production in the three years ended May 1, 1916, and compare with it the production of iron ore in the three calendar years ended Dec. 31, 1915, making allowance for the exports in the same years and the imports in the three years ended March 31, 1916. Items not covered in such an estimate will practically take care of themselves. For instance, the production of mill cinder and scale and zinc residuum are all high, in keeping with the high rate in pig-iron production. One element that might appear to disturb the calculation is the employment of wrought steel turnings in the blast furnace, but that is local and does not greatly affect the country as a whole.

The comparison shows that 40,000,000 tons of pig iron corresponds with 73,700,000 tons of iron ore. Taking iron-ore imports in the twelve months ended March 31, 1916, as a conservative estimate of what may be expected in the near future, and deducting last year's exports there is a correction of 700,000 tons, leaving 73,000,000 tons to be found at home in Lake Superior ore shipments this season, production in other districts, and possible reduction in stocks on dock or at furnaces.

It is to be noted that the production outside the Lake Superior region does not fluctuate nearly as widely as does the Lake Superior production. The Lake Superior ranges take care of most of the variation in pig-iron production. Thus in the past ten years the minimum outside production has been 8,326,327 tons and the maximum 10,560,991 tons, the divergence from the mean being 12 per cent. The minimum Lake Superior production has been 28,108,079 tons and the maximum 52,377,362 tons, the divergence from the mean being 30 per cent, or two and one-half times as great. A fair estimate of the outside production is 11,000,000 tons, leaving 62,000,000 tons to be provided by Lake Superior ore shipments or by reduction of stocks.

The maximum shipments down the Lakes have been 49,070,478 tons, in 1913. Shipments in April of this year broke the April record for shipments, made in 1910, by 138,106 tons, while May shipments broke the May record, made in 1913, by 1,165,368 tons. May broke not only the May record, but the record for any month, by 245,164 tons. To June 1 the shipments were 10,107,991 tons. With May shipments at 8,449,580 tons it does not seem out of line to expect an average of 9,000,000 tons a month for the months June to September inclusive, and if October should move 8,000,000 tons and November 6,000,000 tons the season's total down the Lakes would be 60,000,000 tons, which with a million tons by all-rail would supply all but a million tons of the requirements estimated above. These estimates of prospective ore movement may be regarded in some quarters as a trifle high, but a million tons is doubtless small for a reduction of stocks at Lake docks and at blast furnaces. On the whole there seems to be sufficient leeway.

Thus it would appear, from such estimates as can be made at this time, that the American iron industry is assured sufficient ore to operate at capacity until the opening of Lake navigation in 1917. Whether it will be called upon to operate at full capacity until that time is a much more complicated question. In the extreme case the pinch would not be felt, of course, this year, but next spring.

Scientific Rating of Employees

A contribution of great importance to industrial management was made by the article in THE IRON AGE of June 8 by George D. Babcock, on "Fixing Individual Wage Rates on Facts." It marks a long step forward in giving wage rates a scientific basis. Scientific management as generally understood has helped immeasurably in rewarding each worker according to his ability, through its task carefully set and its bonus for accomplishment. The new method of setting rates gives a man credit for expertness not merely as measured by his bonus earnings, but by the number of general manufacturing processes of which he is master. It provides compensation more or less in proportion to the number of years of service, thereby fostering a sense of loyalty which was more common in the times of small shops and intimate contacts between manager and men. It attempts to free the establishing of a base rate for each class of labor from the controversies usually attending such efforts, and all in all stands for a very definite consideration of each employee as an individual, properly the subject of study. The assuring fact about the new method is that it is being applied with notable success in the works in which the author is production manager. The strong appeal to the individual is well shown in the copies of blanks given out, informing the employee of such changes in rate as are shown to be due him and the reason therefor.

Two features of the method merit attention. One is that each employee is given such a rating as will equitably represent his value to the industry. The author seems to arrive at this rating about as follows: He first considers what may be called the standard workman. This man is given a rate which takes into account the number of processes which the standard workman would be a master of and the maximum number of years which he could be in the employ of the company. To this wage outlay upon the workman by the company, increased by the expected total fulfillment of the task set under scientific management, is added the hourly cost to the company of the factory space, equipment and facilities provided for such workman. This total expenditure per hour is then divided by the actual earning rate of the standard workman and the quotient or ratio is the ratio which the author indicates must be held by any other workman in comparing his cost to his earnings.

For example, in the case of any particular workman, the rate which he should secure in terms of his ability, as measured by mastery of certain manufacturing processes and by his years of service and his reward under the task and bonus plan, is charged against his account, so to speak, as is also the cost of providing him with manufacturing facilities—the latter item being the man-hour burden. This total charge must bear the same ratio to the actual payment to the workman as the corresponding charge for the standard workman bears

to the hourly compensation of the standard workman.

The actual rate which the particular workman should get in order to preserve this ratio is thus subject to mathematical determination. In other words, the unknown rate or the rate whose value is sought must be such that increased by the bonus earnings of the individual and increased also by the equivalent hourly cost of spoiled work it will make the ratio the same as that for the standard workman. Expressed otherwise, the expenditure made by the company for the individual, taking into account the man-hour burden, is divided by the sum of the hourly cost of spoiled work and a rate which, increased by the premium factor, makes the quotient equal to the ratio for that class of workmen. The equation in the article mentioned appears somewhat elaborate in that it provides for the percentage of the time under which the operative has been working under premium and bonus and the time that he has been engaged in day work, as well as the time he has been laid off and is, as the author expresses it, under a retainer.

By this system of measurement of the worker's value, it is possible for the higher priced man to suffer from so much spoiled work and from so many absences that his adjusted rating becomes too low for him to continue in employment, in which case he is automatically eliminated from the organization. The employee along in years and handicapped by limited output and spoilage has the factor of years of employment to offset his deficiencies and he may thus secure a rate which makes it advantageous to continue.

The second point is that wage rate readjustments may be made for short periods—two or three months. Thus the notice to each employee tells him why the rate is changed and how it may be improved for the succeeding period; if he has been given an advance, the note informs him how this may be again increased. Schooled to understand that his wage rate, on which bonus is allowed, is a variable factor depending on himself, he does not align himself with those who contend that wages once advanced must not recede.

Finally, the whole intent of the mathematical rating of workers is to eliminate variable actions of supervisors, particularly in recommendations for discharge or suspension. Few foremen have the same opinion of the different factors involved in a worker's value.

CORRESPONDENCE

The Duluth Furnace and Dry Air

To the Editor: In the issue of THE IRON AGE of June 8, reference is made to the work of the Duluth furnace in the month of December, 1915, which is very excellent in every way. The statement concludes with the remark "and there is no Gayley dry blast." Now this is unfortunate, for if the furnace had a dry air plant it would be able to maintain the excellent results of December throughout the whole year. It is a well-known fact that in winter the Minnesota atmosphere is remarkably dry, and it was never thought that my dry air process could supplant the Lord's process when in operation at Duluth in the winter months but that it had a value in other localities which were not so highly favored, where the moisture in the air is higher and more variable, and where it becomes excessive in the summer. I greatly appreciate this further testimony to the value of dry air in furnace practice.

JAMES GAYLEY.

New York, June 10, 1916.

Navy Bill Passed, with Anti-Time Study Rider

WASHINGTON, D. C., June 12, 1916.—The Naval appropriation bill, which passed the House recently is not only the largest ever presented in Congress but in several other highly important respects it marks an epoch in legislation for the support of the navy. By a substantial majority the Tillman bill appropriating $11,000,000 for the purchase or construction of a Government armor factory was incorporated as an amendment; the Secretary of the Navy is specifically authorized to expend no less than $6,000,000 in fitting up half a dozen practically abandoned navy yards for the construction of warships in the event that private manufacturers are unwilling to build the vessels authorized by Congress at the price limits fixed in the bill, and provision is made for the construction of 50 submarines in place of the 20 recommended by the House committee.

In the face of overwhelming testimony concerning the efficiency of scientific shop management systems now in use in several of the departments and over the protests of the Secretary of War, the Postmaster General and many government experts, the House refused, 100 to 74, to strike from the bill the committee provision forbidding time studies and the use of the stop watch in connection with any work done for the navy. The arguments used by the managers of the bill in forcing through the most important of these provisions were those of the demagogue and socialist, but proved effective enough under the circumstances. With a very few exceptions the opponents of the provisions voted into the bill were but half-hearted and apparently welcomed their own defeat.

Bloom Heating Furnace Using Powdered Coal

The Pennsylvania Steel Company at Steelton, Pa., is to install a continuous bloom heating furnace, utilizing powdered coal on the Holbeck system controlled by the Bonnot Company, Canton, Ohio. The furnace is to take the place of five producer-gas-fired reverberatory-type furnaces. It will be 12 ft. wide and 50 ft. long and is to take 1-ton blooms. It will have 10 pulverized coal burners, six at the discharge end and two on each side. It is practically a duplicate of a furnace now in use at the Pennsylvania plant. It is sold under a guarantee to heat at the rate of 25 tons of steel per hour at not over 150 lb. of coal per ton of steel heated.

B. F. Avery & Sons, manufacturers of farm implements, Louisville, Ky., have issued a statement as to conditions at the beginning of their ninety-second business year. A presentation of the market situation shows the manner in which the various items which enter into the manufacture of the Avery products have increased in price. Then follows this statement: "It is evident from the above that advanced prices for plows and implements are unavoidable and that a greater advanee is justified than has been made."

The Upson Nut Company, Cleveland, Ohio, is installing 4 Hughes gas producers in addition to the 11 producers now in use. One open-hearth furnace has been added to the plant since it was built a few years ago, and the new producers are to provide gas capacity thus required.

It is reported that extensive docking facilities for iron ore and coal will be built by the Pennsylvania Railroad at Lorain, Ohio, following its purchase of the Lorain, Ashland & Southern Railroad. The proposed docks will adjoin the ore docks of the National Tube Company.

STATUS OF FERROMANGANESE

Apparent Supply of Ferromanganese Large—Current Output Highest Recorded

The blast-furnace report for May, published in THE IRON AGE, June 8, showed a production in this country of 35,844 gross tons of ferromanganese and spiegeleisen—the largest output of manganese-iron alloys for steel-making purposes in the history of the country. This is double the monthly output for 1915 and exceeds the record year, 1913, by nearly 9000 tons per month, the monthly output that year having been 20,464 tons. Beginning with August, 1915, the production has exceeded 23,000 tons per month, passing 30,000 tons in April, 1916. Previous to this the output in any one month was usually under 20,000 tons. The following table compiled from the monthly blast-furnace figures of THE IRON AGE shows the combined and relative output of these alloys for the last four years in gross tons:

Production of Ferromanganese and Spiegeleisen in the United States

	Ferromanganese and Spiegeleisen	Average per Month	Ferromanganese	Spiegeleisen
1912.....	244,884	20,407	125,378	119,506
1913.....	245,576	20,464	119,495	126,081
1914.....	206,448	17,204	106,083	100,365
1915.....	239,824	19,985	146,542	93,282
1916 to May 1..	145,837	29,167*	80,554	65,283

*At this rate the 1916 output will be about 350,004 gross tons, consisting of 193,328 tons of ferromanganese and 156,676 tons of spiegeleisen.

The table shows that the 1916 output of manganese-iron alloys will exceed 350,000 tons if maintained at the average for the last five months. There is not much likelihood that it will decidedly decrease, for there are two more blast furnaces scheduled to produce these alloys which should at least compensate for any diminution from other sources.

IMPORTS OF FERROMANGANESE

Not only has the domestic situation as to output been gratifying, but thus far this year imports of standard 80 per cent ferromanganese have been very favorable. From official Government figures furnished THE IRON AGE, imports this year have been as follows:

Imports of Ferromanganese Into the United States

	Gross Tons	Per Month, Gross Tons
January, 1916.....	5,397	....
February, 1916.....	6,892	....
March, 1916.....	7,112	....
April, 1916.....	6,497	....
Total to May 1, 1916.....	25,898	6,474
Total for 1916 at this rate.....	77,688	6,474
Total for 1915.....	55,201	4,600
Total for 1913.....	128,070	10,672
Average per year for 5-years (1910-14)	100,793	8,399

It will thus be seen that the present import rate is about 60 per cent of the record rate in 1913 and nearly 50 per cent greater than in 1915 and exceeds 75 per cent of the 5-year average. British restrictions as to exports have been relaxed, due either to the threatening injury to their business with this country because of increasing output here or because of easier manganese ore conditions there.

BRITISH AND AMERICAN MANGANESE ORE SUPPLIES

British imports of manganese ore thus far in 1916 have been a little larger than in 1915. To May 1, 1916, the official imports have been 132,598 gross tons, or 33,049 tons per month, against 377,324 tons in 1915, or 31,443 tons per month. In 1913 the monthly imports were 50,098 tons and in 1914 they were 39,953 tons.

Manganese-ore imports into the United States thus far this year, reports having been published only to April 1, have been small,—less than the average for 1915, but the supply comes irregularly and there is no reason to believe that it is lessening. The relative imports are shown by the following table in gross tons:

Manganese-Ore Imports Into the United States

Period	Gross Tons	Per Month, Gross Tons
1915.....	320,782	26,731
1914.....	283,294	23,608
1913.....	345,090	28,757
Average for five years (1910-14)...	269,649	22,470
To April 1, 1916.....	51,545	17,181
Nine months ended March 31, 1916..	307,382	34,154
Nine months ended March 31, 1915..	158,985	17,665
Nine months ended March 31, 1914..	212,270	23,586

It will thus be seen that while the imports in the first three months of this year are only 17,665 tons per month, for the nine months of the present fiscal year, or to April 1, 1916, they have been 34,154 tons per month, exceeding the record in 1913 of 28,757 tons per month. This large supply of ore is coming almost entirely from Brazil, whereas before the war that country supplied only about 20 per cent of this country's consumption, the remainder coming from Russia and India.

Since the last review of this subject by THE IRON AGE there has been produced in this country, besides the regular grades of 18 and 20 per cent spiegeleisen and the standard 80 per cent ferromanganese, numerous intermediate products containing 30 to 40, 40 to 50, 50 to 60, 60 to 70 and 70 to 80 per cent manganese. These alloys have been easily sold and used as partial substitutes for the other standard grades. Just how much of these alloys have been made it is difficult to express in tons, but it is a small percentage of the total. Taking all these alloys the present rate of production is larger than ever before.

Summarizing the foregoing and taking the sum of the importations and the production of the standard 80 per cent ferromanganese as the apparent available supply for consumption, we have the following:

Year	Imports, Gross Tons	Production, Gross Tons	Apparent Supply, Gross Tons	Apparent Supply Per Month, Gross Tons
1912.....	99,137	125,378	224,515	18,709
1913.....	128,070	119,495	247,565	20,630
1914.....	82,217	106,083	188,300	15,691
1915.....	55,201	146,542	201,743	16,812
Average for five years, 1910-1914	100,793	99,363	200,156	16,679
1916.....	77,688*	193,320*	271,008*	22,584*

*Probable figures based on the monthly returns thus far this year.

These figures show the surprising fact that the present apparent supply per month has increased over 5500 tons over that at the close of 1915 when the apparent supply was about equal to the 5-year average, in spite of the war. This was regarded at the time as a remarkable showing though doubted by many when it was published. It also considerably exceeds the record apparent supply in 1913 of 20,630 tons per month. The present import rate means 77,688 tons in 1916, which is over 75 per cent of the 5-year average and about 50 per cent in excess of those of 1915. Partial returns for May indicate the largest month this year. More significant and important, however, is the present large production rate which means an output in 1916 of 193,320 tons of standard ferromanganese.

APPARENT SUPPLY AND CONSUMPTION

To what extent the probable apparent supply in 1916 of over 271,000 tons of ferromanganese will meet the needs of the country is a difficult question to answer. Assuming that the present steel output of all kinds is at the rate of 44,000,000 tons per year, 333,928 tons of ferromanganese would be necessary at 17 lb. to the ton. It is a fact, however, that large quantities of spiegeleisen are consumed in making Bessemer high-carbon steel. A conservative estimate places two-fifths of the Bessemer steel output as high-carbon steel. Taking 73 per cent of the total output as non-Bessemer steel, requiring ferromanganese, and adding to this three-fifths of the remainder, as also requiring ferromanganese, we have, estimating 17 lb. of alloy to the ton of steel:

44,000,000 × 0.73 = 32,120,000 tons.
44,000,000 — 32,120,000 = 11,880,000 × 2/5 = 4,752,000.
11,880,000 — 4,752,000 = 7,128,000
32,120,000 + 7,128,000 = 39,248,000 tons.
39,248,000 × 17 = 586,432,000 lb. or 297,864 gross tons.

as the apparent consumption in 1916. To supply this our estimates show 271,008 tons, or an apparent deficit of about 26,800 tons.

It is known that unusual economies have been practised since the war started in the use of ferromanganese. It is also a fact that spiegeleisen has been in many cases substituted for ferromanganese, at least in part, by using the two alloys together. This is indicated by the large increase in spiegeleisen production—43 per cent over that of 1915. It is also apparent that the lower percentage alloys have been used to no small extent. The most liberal use of 50 per cent ferrosilicon has also played its important part. Added to these considerations is the remelting of spiegeleisen for concentration to a higher manganese alloy as well as the possible lowering of the final manganese content in the steel. The fair conclusion is therefore that the apparent deficit, shown by this analysis of the situation, is fully compensated for by the above economies and substitutes.

Preceding analyses of the ferromanganese situation appeared in THE IRON AGE, March 4 and Aug. 5, 1915, and Jan. 27, 1916.

NEW REVENUE MEASURE

Higher Income Surtax and Heavy Tax on Munitions and Inheritances—Tariff on Dyes

WASHINGTON, D. C., June 13, 1916.—One of the most radical revenue measures ever presented in Congress will be completed within a few days by the majority members of the Ways and Means Committee and reported to the House before the end of the coming week. Unusual interest will attach to this extraordinary bill for the reason that if the party now in power should lose the Presidency and Congress next November, the taxing provisions of the measure would probably be wiped off the statute books or materially modified within a year.

The so-called omnibus revenue bill will provide for a heavy increase in the income tax rates, impose a Federal inheritance tax, levy a tax on the profits of manufacturers of war material, readjust the special occupational taxes, and repeal schedules A (documentary stamp taxes) and B (perfumery and cosmetic taxes) of the emergency war revenue act, increase the customs duties on certain dyestuffs, provide a more or less effective anti-dumping clause and authorize the appointment of a so-called non-partisan tariff commission. At one time, the framers of the bill contemplated increased rates of internal revenue tax on distilled spirits and malt liquors but these have been rendered unnecessary by the fact that the customs and internal revenue receipts of the past six months have so far surpassed expectations that the revenues of the fiscal year promise to exceed by at least $75,000,000 the estimates made by the Secretary of the Treasury at the beginning of the present session of Congress.

It is proposed to secure at least $100,000,000 additional revenue to assist in meeting the increased cost of the national defense and the current Treasury deficit, by raising the rates of the income tax. This being election year, the majority leaders have decided that it would be unwise to reduce the exemptions; hence, single men whose incomes do not exceed $3,000 and married men who do not receive more than $4,000 will continue to pay no tax. Under the present law the 1 per cent rate applies to incomes up to $20,000, but under the omnibus revenue bill the surtax of 1 per cent will attach to all incomes of more than $10,000 and upon those in excess of $20,000 the rates will be materially increased, the frankly stated object of the majority members of the Ways and Means Committee being to "make the rich pay for preparedness."

In considering the advisability of levying a Federal inheritance tax, the committee has been confronted with the fact that many of the States have already adopted such laws so that a Federal levy in many cases would amount to double taxation. To meet this situation, it has been decided not to tax small inheritances but to impose a rate of 2½ per cent on those in excess of $100,000. Inheritance tax receipts are roughly figured at $40,000,000 to $50,000,000 per annum.

INCREASED IMPORTS EXPECTED

That it is the committee's intention to levy a high rate on the manufacturers of war material and "take the profit out of war" is obvious from the fact that it is estimated that the tax will produce not less than $50,000,000 per month. The committee leaders assert that the end of the war will be promptly followed by such an increase in the importations of dutiable merchandise that the customs revenues will supply any deficit due to the loss of the munitions tax.

There is food for serious thought in these predictions of increased importations following the war. Notwithstanding that Germany, France and England are devoting their chief energies to the production of war material, it is surprising that our total imports for the ten months ending April of the current year have amounted to $1,722,400,000, an increase of $348,200,000 over the corresponding period of 1915, and $150,000,000 in excess of the record figures of the ten months of 1914. If our imports, stimulated by the low rates of the Underwood-Simmons tariff act, can make such iscreases under existing conditions of reduced foreign production, inadequate transportation and unparalleled maritime risk, what may be expected when normal conditions are restored?

ANTI-DUMPING PROVISION

Whether the Ways and Means Committee will report an anti-dumping clause based upon the countervailing provision which was offered as an amendment to the Underwood-Simmons tariff law and rejected by the Democratic leaders, or will rely upon an amendment to the anti-trust laws penalizing dumping as a form of unfair competition, has not yet been decided and it is possible that a composite measure will ultimately be agreed upon. The so-called Rainey provision authorizing the appointment of a non-partisan tariff commission has been adopted but will encounter considerable opposition from the Bryan wing of the majority. The practically unanimous vote of the Republicans of the House will be cast for it.

The decision of the Ways and Means Committee to increase the duties on certain dyestuffs is the result of peculiar reasoning. The majority members appreciate that many important industries, including the growing and manufacture of cotton, will regard with deep disfavor any party that refuses to assist in establishing dyestuff plants in the United States. The explanation offered, however, is that while the protective theory, as generally applied to the industries of the country, is fallacious and even vicious, in the solitary case of the manufacture of dyestuffs the peculiar existing circumstances, especially the extraordinary competitive methods employed by Germany, appear to justify the adoption of protective duties, at least as an experiment.

W. L. C.

Eddystone Company Sold to John E. Sullivan

The Eddystone Steel Company, Crum Lynne, Pa., has sold its property and business to John E. Sullivan, Reading, Pa., formerly general sales manager of the Carpenter Steel Company. The plant, then idle, was bought a few months ago by Walker Brothers & Haviland, Philadelphia, who, after some remodeling, put it in operation, incorporating the Eddystone Steel Company. It is equipped with one 15-ton basic open-hearth steel furnace, one 22-in. billet mill and two 60-in. plate mills. Orders booked are stated to be sufficient to enable the plant to run well into 1917. Additional equipment is to be installed.

Manganese Ore Imports

Manganese ore imports into the United States in March were 26,212 gross tons against 398 tons in March, 1915. For the first quarter of 1916, they are 51,545 tons or 17,181 tons per month, which compares with the average for 1915 of 26,731 tons per month. For the 9 months ended March 31, 1916, they were 307,382 tons against 158,985 tons and 212,270 tons for the same period in 1915 and 1914.

NEARLY A HALF BILLION

Value of Ammunition, Explosive and Firearms Exports in the War Period

WASHINGTON, D. C., June 13, 1916.—Exports of ammunition, explosives and firearms for the 21 months period of the European was, Aug. 1, 1914, to April 30, 1916, have reached the huge total of nearly half a billion dollars. Shipments of these articles are being made at a rapidly increasing rate, nearly half this enormous total having been exported in the past four months. Notwithstanding current reports to the effect that fewer foreign contracts for war material are now being placed than heretofore, it is doubtful if the maximum of production has yet been reached.

To the total exports of ammunition, explosives and firearms for the period of the war cartridges contribute $44,271,750, gunpowder $127,767,170, other explosives $195,649,764, fire arms $22,473,934 and unloaded shrapnel and shells (estimated) $100,000,000. The astonishing growth of this branch of our export trade due to the war, which, exclusive of unloaded shrapnel and shells, has arisen from less than $300,000 per month to approximately $58,000,000 per month, is shown in the following table:

Exports of Ammunition, Explosives and Firearms

1914	Cartridges	Gunpowder	Other Explosives	Firearms
August	$154,080	$16,821	$26,336	$208,644
September .	421,982	65,465	187,510	201,556
October	1,452,740	24,395	56,305	692,146
November ..	1,231,235	23,927	78,062	1,194,510
December ..	1,098,875	27,989	980,665	1,093,158
1915				
January ...	1,381,970	129,617	1,059,961	2,156,757
February ..	1,900,774	34,884	1,020,904	584,694
March	1,616,626	65,481	1,081,860	545,716
April	2,648,667	417,919	2,863,014	464,913
May	3,028,083	1,048,607	4,439,777	1,101,751
June	2,467,378	3,234,549	5,911,186	914,118
July	2,427,761	4,567,929	9,329,303	1,948,717
August	2,284,540	5,296,118	6,967,046	603,413
September ..	1,412,144	8,026,511	8,743,149	1,047,722
October	1,648,329	6,593,691	10,836,147	556,740
November ..	1,737,673	16,730,384	13,495,527	1,197,768
December ..	2,260,734	20,201,180	23,366,260	954,102
1916				
January ...	3,343,497	10,104,525	13,192,567	1,513,087
February ..	3,616,702	12,043,610	32,710,132	1,902,020
March	4,174,827	16,868,622	29,572,783	1,568,379
April	3,963,133	22,245,946	29,711,270	1,933,953
Total $44,271,750		$127,767,170	$195,649,764	$22,473,934

The aggregate of the exports of ammunition, explosives and firearms, as shown in the above table, is $390,162,618, of which $188,475,063, or nearly one-half, was shipped in the first four months of the current calendar year. These figures do not include unloaded shrapnel and shells, however, and the total exports of these articles are arrived at by the authorities from an examination of the figures representing unenumerated exports of iron and steel. At the beginning of the war these miscellaneous shipments averaged about $1,300,000 per month. For the period of the war unenumerated exports of iron and steel have aggregated $125,015,021, of which it is estimated upward of $90,000,000 is represented by shrapnel and shells, making a grand total of approximately $480,000,000 of ammunition, explosives and firearms shipped during the war period.

With these impressive totals on record, there will naturally be some curiosity as to the basis of the recent statement made by the Secretary of Commerce to the effect that our current shipments of war material constitute but 10 per cent of our exports. As a matter of fact, our exports of ammunition, explosives and firearms alone have amounted to about 15 per cent of our total shipments of merchandise of all classes, and when to this total are added such of our exports of iron and steel, automobiles, saddlery, harness, boots, shoes, clothing and food products as are strictly classifiable as war material, the absurdity of the secretary's statement is clearly apparent. No one who has followed with care the statistical record of our export trade since the beginning of the European war can accept his calculations or agree with his conclusion that the end of the war will mean little or nothing to American manufacturers and exporters. W. L. C.

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Iron and Steel Markets

WIDENING EXPORT INQUIRY

Steel Prices Strong; Pig Iron Weak

Rails Added to Russia's Inquiries—Shipping Tariffs, Much Easier, a Check to Declines

Little or no concern is yet shown over the stability of present high prices. Manufacturing consumers with stocks at hand and material still coming in under contracts much below present market prices have been making concessions on their products to secure a turn-over, following some recent indications of an easier situation in mill sales. With contracts expiring this month, the surface ripples may have no wide effect, particularly as a renewal of export inquiry of large proportions has developed. Foreign buying is much encouraged by the sharp reductions in ocean freight rates, of 20, 30 and even over 50 per cent from recent tariffs.

The lifting of pressure of domestic buying, continuous for so many months, tends to exaggerate the comparative lull in new buying. Mills are not urging purchases, as present obligations involve far future operations; most of them hold that there is no advantage in taking on commitments of uncertain value.

Russia looms important in foreign demand. Already the indications are that the Steel Corporation is to supply 150,000 to 200,000 tons of a total of 350,000 tons of 67½-lb. rails; within two or three weeks upward of 10,000 cars will probably be bought here, arrangements for a Russian loan having been perfected, and before the end of the month it is expected that a large tonnage of barb wire will be placed, though hardly the amount commonly spoken of, which is only slightly below the country's annual barb-wire making capacity. It is doubtful if deliveries on the rails can begin before March.

War buying proceeds steadily. Representatives in this country are now placing small rather than large orders, and while close figuring so far as war prices go is common, mills have a possible outlet on every occasion that the domestic demand does not round out the rolling schedule.

Enough plates to build several ships have been bought at 4c., Pittsburgh, for shipment to Japan in the fourth quarter of this year and the first of next, and yet Cleveland reports boiler makers as allowing cancellation of plates under contracts at much less than going prices. As another contrast is a boiler steel contract of over 1000 tons closed for the fourth quarter at 4c. The plate demand is still conspicuously strong except for universal plates, which need a widening of steel building and railroad car construction to prevent price concessions on top of the easier deliveries.

Late price lapses have occurred in open-hearth billets and sheet bars, under the influence of the heavy offerings of discarded shell steel, and in galvanized sheets, as reported from Cleveland, reflecting the lower prices of spelter. Bars and shapes are held firmly, and in the face of a refusal to shade 2.50c., Pittsburgh, for fourth quarter or first half bars, implement makers are holding back on 1917 contracting. Cleveland reports considerable general business put under contract for the last half at 2.50c., Pittsburgh, for bars and shapes and 2.90c. for plates.

Pig iron has again declined. May shipments of merchant furnaces in the Central Western territory exceeded those of April, but they also exceeded the May production. At Chicago 7500 tons of Bessemer was sold for export at a price under $20.50, Valley. Spot Southern has been done at $14.50, Birmingham. The foreign demand for pig iron exceeds 50,000 tons, of which 25,000 tons is for Italy.

Bridge building and structural work was put under contract in May to a total of about 140,000 tons, which is slightly above the average monthly rate so far this year.

Pittsburgh

PITTSBURGH, PA., June 13, 1916.

Export inquiry for finished steel seems to be heavier than domestic. Russia recently came in the market for about 200,000 tons or more of barb wire, and it is said the leading interest has taken about 150,000 tons of this contract for delivery over the remainder of the year. Russia is also reported in the market for 300,000 to 350,000 tons of 60-lb. rails, and it is claimed that about half of this order has been placed with Steel Corporation mills, part of the tonnage to be rolled in this district. The general iron and steel market is quiet, and it is not believed there will be much new buying until probably about September, at which time consumers who have not covered their needs for the last quarter of the year are expected to place contracts. Mills are not urging consumers to buy at the high prices ruling, and prefer to get further ahead on their obligations before taking on much new business. In line with this, consumers are not buying anything more than they have to. One leading steel mill is offering steel bars, plates and shapes for four to six weeks' delivery at somewhat lower prices than are being named by other mills that make the same products, but that are practically filled up for four or five months. There is some inquiry for sheet bars for third quarter and $40 to $42 is generally named. Pig iron is dull, but fairly strong. Prompt coke is lower in price, and scrap is neglected and weak.

Pig Iron.—The local market is quieter now than at any time in more than a year. There are inquiries for probably 25,000 tons of Bessemer for shipment to Italy on which figuring is being done on the basis of about $21, Valley furnace. There is no domestic demand for pig iron, consumers evidently being covered for some months. The supply of Bessemer iron is limited and prices are firm, but basic seems more plentiful. Foundry iron is dull, due largely to the molders' strike, which has been running nearly six months, and there is still some foundry iron being offered for resale by foundries that bought it some months ago, and find they do not need it. We quote Bessemer iron at $21; basic, $18; gray forge, $17.75 to $18; No. 2 foundry, $18 to $18.50, and malleable Bessemer, $18.50 to $19, all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 95c. per gross ton.

Billets and Sheet Bars.—Heavy offerings are still being made of rejected shell steel in the form of billets and slabs, and while this is not suitable for purposes for which soft open-hearth steel is used it is having the effect of depressing prices on the latter to some extent. On inquiries for open-hearth sheet bars for third quarter, $40 to $42 at maker's mill has been quoted by a few sellers, other mills still asking $45 or higher. Prices on Bessemer steel are firm, as it is

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton:	June 14, 1916.	June 7, 1916.	May 17, 1916.	June 16, 1915.
No. 2 X, Philadelphia....	*$20.00*	$20.25	$20.50	$14.25
No. 2, Valley furnace...	18.00	18.00	18.00	12.75
No. 2 Southern, Cin'ti..	*17.40*	17.65	17.90	12.40
No. 2, Birmingham, Ala..	*14.50*	14.75	15.00	9.50
No. 2, furnace, Chicago*	19.00	19.00	19.00	13.00
Basic, del'd, eastern Pa..	*19.75*	20.00	20.50	13.50
Basic, Valley furnace....	18.00	18.00	18.00	12.65
Bessemer, Pittsburgh ..	21.95	21.95	21.95	14.70
Malleable Bess., Ch'go*.	19.50	19.50	19.50	13.00
Gray forge, Pittsburgh..	18.70	18.70	18.70	13.35
L. S. charcoal, Chicago..	19.75	19.75	19.75	15.75
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh..	45.00	45.00	45.00	20.50
O.-h. billets, Pittsburgh..	*40.00*	42.00	43.00	20.50
O.-h. sheet bars, P'gh....	*40.00*	42.00	43.00	21.50
Forging billets, base, P'gh	69.00	69.00	69.00	26.00
O.-h. billets, Phila.....	50.00	50.00	50.00	22.02
Wire rods, Pittsburgh.,.	55.00	55.00	60.00	25.00
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia..	2.659	2.659	2.659	1.17½
Iron bars, Pittsburgh...	2.60	2.60	2.60	1.25
Iron bars, Chicago.....	2.35	2.35	2.35	1.20
Steel bars, Pittsburgh...	2.75	2.75	3.00	1.20
Steel bars, New York...	2.919	2.919	3.169	1.369
Tank plates, Pittsburgh..	3.75	3.75	3.75	1.15
Tank plates, New York..	3.919	3.919	3.919	1.319
Beams, etc., Pittsburgh..	*2.50*	2.60	2.60	1.20
Beams, etc., New York..	2.669	2.669	2.769	1.369
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.15
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.20
Steel hoops, Pittsburgh..	2.75	2.75	3.00	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	June 14, 1916.	June 7, 1916.	May 17, 1916.	June 16, 1915.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.90	2.90	2.90	1.75
Galv. sheets, No. 28, P'gh	4.75	4.75	5.00	5.00
Wire nails, Pittsburgh...	2.50	2.50	2.50	1.55
Cut nails, Pittsburgh....	2.60	2.60	2.60	1.55
Fence wire, base, P'gh..	2.45	2.45	2.45	1.35
Barb wire, galv., P'gh...	3.35	3.35	3.35	2.40
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	*18.00*	18.50	18.00	12.25
Iron rails, Philadelphia..	20.00	20.00	20.00	15.00
Carwheels, Chicago	12.75	12.75	13.00	10.25
Carwheels, Philadelphia.	16.50	16.50	16.50	11.50
Heavy steel scrap, P'gh..	16.00	16.00	17.00	11.75
Heavy steel scrap, Phila.	*15.50*	16.00	16.50	11.00
Heavy steel scrap, Ch'go.	*14.75*	15.00	16.00	9.25
No. 1 cast, Pittsburgh...	16.00	16.00	16.25	12.25
No. 1 cast, Philadelphia.	*16.50*	17.50	17.50	12.25
No. 1 cast, Ch'go (net ton)	*11.75*	12.00	12.50	9.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt...	*$2.40*	$2.75	$2.25	$1.60
Furnace coke, future....	2.50	2.50	2.50	1.75
Foundry coke, prompt...	3.25	3.25	3.00	2.00
Foundry coke, future...	3.50	3.50	3.25	2.25
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York..	*28.00*	28.25	29.00	22.50
Electrolytic copper, N. Y.	*27.75*	28.00	28.62½	20.37½
Spelter, St. Louis.....	*13.25*	13.37½	15.25	21.50
Spelter, New York.....	*13.50*	13.62½	15.50	22.00
Lead, St. Louis.....	*6.70*	6.85	7.40	7.00
Lead, New York.....	*6.85*	7.00	7.50	7.00
Tin, New York.....	*43.25*	44.25	49.25	42.25
Antimony, Asiatic, N. Y.	*20.00*	23.00	33.00	37.50
Tin plate, 100-lb. box, P'gh.	$5.75	$5.75	$5.50	$3.10

scarcer than open-hearth. We quote soft open-hearth billets and sheet bars at $40 to $42; Bessemer billets, $45; Bessemer sheet bars, $45, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Ferroalloys.—There is very little inquiry for ferromanganese for prompt shipment, consumers evidently being covered for some time ahead. English 80 per cent is still about $175, seaboard, for delivery in first half of 1917, but neither English producers nor importers will give any guarantee as to shipments. Spiegeleisen running 18 to 22 per cent is lower, being offered at $50 to $55, while 25 to 35 per cent is offered at $55 to $60 at furnace. Prices on Bessemer ferrosilicon of the lower grades are still being shaded $2 per ton by one producer, but prices on 50 per cent are very strong. We quote 80 per cent domestic ferromanganese for prompt shipment at $225 to $250 in small lots, f.o.b. at maker's furnace. We quote 50 per cent ferrosilicon at $85 for lots up to 100 tons, over 100 tons and up to 600 tons, $84, and over 600 tons, $83, all per gross ton, f.o.b. Pittsburgh. Prices of Bessemer ferrosilicon for delivery over remainder of the year are now quoted as follows: 9 per cent, $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50, and 16 per cent, $43. Seven per cent silvery for the same delivery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. All these prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of $2 per gross ton to Pittsburgh.

Steel Rails.—Reports are that Russia is in the market for about 350,000 tons of 60-lb. steel rails, and that about half of the order has already been placed. The domestic demand for standard sections is dull, as most roads are covered on their requirements of rails for all of 1917. The new demand for light rails is good from the lumber and coal mining interests, the traction lines buying very few. We quote light rails as follows: 25 to 45 lb. sections, 2.10c.; 16 and 20 lb., 2.15c.; 12 and 14 lb., 2.20c., and 8 and 10 lb., 2.25c., in carloads and up to 100 tons. An advance of 5c. per 100 lb. is charged for less than carloads and down to 3 tons, while under 3 tons an additional 5c. is charged. We quote standard section rails of Bessemer stock at 1.47½c., and open-hearth steel, 1.56½c., Pittsburgh.

Plates.—New inquiries for steel cars are light, and it is evident the railroads have decided to wait until the steel car companies will name lower prices. The only order of the week was 1000 wooden box cars placed with the Haskell & Barker Car Company by the Baltimore & Ohio Railroad. The new demand for plates is not so urgent as it was some time ago, and consumers are able to buy prompt plates slightly lower. The mill price on ¼-in. and heavier steel plates is 2.75c. for delivery in last quarter of 1916 and first quarter of 1917. For shipment in six to eight weeks mills quote 3.50c. to 4c., and sales are being made at these prices. Two of the leading plate mills are sold out for this year and are taking orders for first quarter of next year at 2.75c. at mill.

Structural Material.—New inquiry is only fairly active, but local fabricators, as a rule, are not bidding actively on new work, being filled up for practically the remainder of this year. The Fort Pitt Bridge Works has taken 850 tons for grade crossings for the New York Central, and the McClintic-Marshall Company has taken 400 tons of bridge work for the Jersey Central and 250 tons for the Queensboro bridge. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill for delivery in third and fourth quarters, while small lots from stock are held at 3.25c. up to 4c., prices depending entirely on the size of the order and how soon deliveries are wanted.

Sheets.—The new demand for sheets has quieted down, the trade being covered for practically the remainder of the year. Specifications, notably for electrical and blue annealed sheets, are heavy, and mills are back in shipments 8 to 10 weeks, or longer. Several large contracts for blue annealed sheets for the year starting July 1 have lately been placed. We quote blue annealed sheets, Nos. 9 and 10 gage, at 3c. to 3.25c., some mills quoting as high as 3.50c. We quote No. 28 Bessemer black sheets at 2.90c. to 3c., and open-hearth 3c. to 3.10c.; No. 28 galvanized Bessemer stock, 4.75c.

to 4.85c., and open hearth, 4.90c. to 5c. We quote Nos. 22 and 24 black plate, tin mill sizes, H. R. and A., 2.70c.; Nos. 25, 26 and 27, 2.75c.; No. 28, 2.85c.; No. 29, 2.95c., and No. 30, 3c. These prices are for carload and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—This is probably the strongest item in the whole list of finished steel. Three or four of the leading makers have their output sold up for the remainder of the year, and are refusing to quote on any new domestic or foreign inquiries. Other makers that have a limited amount of tin plate to sell are quoting as high as $6.25 to $6.50 on export and $6 for domestic inquiry. Specifications are heavy, and in some cases a few large consumers will have to buy again before the year is over if their present rate of consumption continues. It is not likely that any tin plate for export could be obtained at much less than $6.50 per base box. We quote from stock at $5.75 to $6, and for export, $6.25 to $6.50, per base box, at mill. Prices on terne plate are firm, and we quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb., and $8.75 to $9 for 214 lb., all f.o.b. at maker's mill.

Cold Rolled Strip Steel.—Contracts placed the past week include 250 tons, 150 tons and 100 tons at $6 per 100 lb., base, for delivery over second half. Small lots ranging up to 10 tons for early shipment bring $6.50 to $7. Leading makers have little to spare before last quarter delivery, and some are practically sold out for this year. The market is firm at $6, base, on contracts and $6.50 to $7 on small lots. Extras, standard with all the mills, were printed in full on page 810 of THE IRON AGE of March 30.

Skelp.—Few new orders are being taken, as the mills are sold up for the remainder of the year. Prices are very firm. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Railroad Spikes.—As yet the Boston & Maine Railroad has not closed on its inquiry for 10,000 kegs of spikes for 1917 delivery. The Chicago, Indianapolis & Louisville is inquiring for 1000 kegs. So far few contracts for spikes have been closed for 1917 delivery, the railroads refusing to pay the high prices quoted by the makers. Prices are only fairly strong, and local makers are quoting in the Chicago district about 10c. per keg above the f.o.b. Pittsburgh price. We quote:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Nuts and Bolts.—It is said that some very large export inquiries for nuts and bolts are in the market, but local makers are not showing much interest in these, as they are filled up so far ahead on domestic and foreign business they cannot make deliveries wanted. The steel supply is better, and the output of nuts and bolts is now at the heaviest rate ever known. All makers are back in shipments six to eight weeks or longer. Discounts in effect from May 19, which the makers state are for prompt acceptance only, are as follows, delivered in lots of 300 lb. or more where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50; large, 40.

Machine bolts, h.p. nuts, small, rolled thread, 50, 10 and 5 per cent; small, cut thread, 50 and 5; large, 40 and 10.

Machine bolts, c.p.c. and t. nuts, small, 40, 10 and 5 per cent; large, 35 and 5.

Blank bolts, 40 and 10 per cent; bolt ends, with h.p. nuts, 40 and 10; with c.p. nuts, 35 and 5. Rough stud bolts, 15. Lag screws (cone or gimlet point), 50 and 10.

Forged set screws and tap bolts, 10 per cent. Cut and round point set screws, case hardened, 60. Square and hexagon head cap screws, 55. Flat, button, round or fillister head cap screws, 30.

Nuts, h.p. sq., tapped or blank, $2.90 off list; hex., $2.90 off; c.p.c. and t. sq. tapped or blank, $2.60 off; hex., $3 off; semi-finished hex., 60 and 10 per cent; finished and case hardened, 60 and 10.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 10 per cent.

Wire Rods.—A reported inquiry from Canada is for 12,000 tons, but local makers say they will not quote on it, as they cannot make the delivery. An occasional small lot of rods is sold to help out a regular customer at $55 to $60 per ton. Practically the entire output of rods for the next three or four months is under contract. For soft Bessemer, open-hearth and chain rods prices range from $55 to $65 per ton, f.o.b. Pittsburgh.

Wire Products.—Several of the large makers of wire and wire nails are covering their trade through the third quarter on the basis of $2.50 for wire nails and $2.45 for plain wire. Several other makers are quoting as high as $2.60 for nails for third quarter and $2.70 for last quarter. The new demand is quiet, as the trade is covered for some time ahead. Specifications are active and present conditions in the wire trade are regarded by the mills as most satisfactory. Prices are firm, but there have been no intimations recently of an advance. Regular prices in effect from May 1 are as follows: Wire nails, $2.50 to $2.60 per keg; galvanized, 1 in. and longer, taking an advance over this price of $2, and shorter than 1 in., $2.50. Plain annealed wire, $2.45 per 100 lb.; galvanized wire, $3.15; galvanized barb wire and fence staples, $3.35; painted barb wire, $2.65; polished fence staples, $2.65; cement coated nails, $2.50, base, all f.o.b. Pittsburgh, with freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are now 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—One leading maker has stated that under no condition will it shade 2.50c. for steel bars for delivery in last quarter or on contracts for delivery in first half of 1917. The implement makers are holding back placing contracts for first half of next year, claiming that prices are entirely too high, based on prices they are obtaining for their agricultural machinery. The mills sold far ahead, and in the light of the present enormous consumption of bars are in position to maintain a strong attitude for some time. The export inquiry for steel rounds for shrapnel is still heavy, but little of this business, if it is being placed, is coming to local mills. It is said that recently some orders for steel rounds have been canceled, the buyers believing prices will be lower in the near future. The demand for iron bars is fair, but the trade is covered for some time ahead and specifications are active. We quote steel bars at 2.50c. to 2.75c. at mill for delivery at convenience of the seller, which would not be before last quarter of 1916 or first quarter of 1917. Small lots for fairly prompt shipment bring 3c. to 3.25c. at mill. We quote refined iron bars at 2.60c. to 2.65c., and railroad test bars 2.70c. to 2.80c. at mill.

Rivets.—Domestic inquiry is only fair, as the trade is covered ahead for some time but foreign demand is active, and it is said three or four carloads for India and South America were placed lately with local makers. Deliveries of steel by the mills are better than for a long time. Prices are firm. We quote buttonhead structural rivets, ½ in. in diameter and larger, at $4 per 100 lb., base, and conehead boiler rivets same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Shafting.—There is not much new buying, the trade being covered for practically the remainder of the year. Specifications are reported fairly active, but not so heavy as some time ago. Prices range all the way from 20 per cent off on desirable contracts for late delivery up to base price on small lots for immediate shipment. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Hoops and Bands.—It is stated that 2.75c. on steel hoops is minimum of the market for extended delivery, and up to 3c. is quoted for fairly prompt shipment. We quote steel bands at 2.75c. to 3c., depending on the delivery wanted, with extras as per the steel bar card.

Merchant Steel.—Only small orders are being placed, the trade being covered for practically the remainder of the year, and specifications against contracts are coming in freely. Prices on small lots for future de-

livery are about as follows: Iron-finished tire, ½ x 1½ in. and larger, 2.35c., base; under ½ x 1½ in., 2.50c.; planished tire, 2.55c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe chalk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Cotton Ties.—The mills have now about enough cotton ties in stock to meet the expected demand for this season, but as yet the price has not been fixed.

Wrought Pipe.—An inquiry is in the market for 12 to 15 miles of 12-in. pipe for Oklahoma. Reports of an inquiry for an oil line embracing 200 to 300 miles of pipe are not credited. It is not believed the large oil or gas interests will lay any important lines, with the price of line pipe now more than double what it was at this time last year. The current demand for merchant pipe and oil well supplies is heavy, and mills are sold up for three or four months. Discounts on iron and steel pipe are firmly held. They will be found on another page.

Boiler Tubes.—Local makers of iron and steel tubes are not taking on many new orders, as they are filled up for about the remainder of the year and report specifications heavy. Discounts, as given on another page, are firmly held.

Coke.—The soft coal strike in the Pittsburgh field is about over, nearly all the mines having resumed, and, as a result, prices on prompt furnace coke are lower, with very little demand. Deliveries of coke to the furnaces are being made promptly, the supply of cars being good and, in fact, there are accumulations of coke at some of the furnaces. There was a small sale of prompt furnace coke on Monday at $2.40 per net ton at oven. On furnace coke for delivery over last half of the year, prices range from $2.50 to $2.75 per net ton at oven, according to grade. We now quote best grades of furnace coke for prompt shipment at $2.40 to $2.50 at oven, and on contracts from $2.50 to $2.75, according to quality. We quote best grades of foundry coke for spot shipment at $2.75 to $3, and on contracts for last half of the year at $3.25 to $3.50. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended June 3 as 431,872 net tons, a decrease over the previous week of 4940 tons.

Old Material.—The local scrap market is stagnant, consumers not being interested, even at present low prices, while dealers are not trying to force sales, knowing it is useless to do so under present conditions. Best grades of heavy melting scrap would probably bring $16.50, but several hundred cars or more that have been rejected by the leading interest could likely be bought at $16, if the buyer gave prompt shipping directions. Dealers quote for delivery in the Pittsburgh and nearby districts that take the same rates of freight, per gross ton, as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$16.00 to $16.50
No. 1 foundry cast	16.00 to 16.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 16.75
Hydraulic compressed sheet scrap	15.00 to 15.50
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	13.00 to 13.25
Bundled sheet stamping scrap	12.00 to 12.25
No. 1 railroad malleable stock	14.25 to 14.50
Railroad grate bars	12.00 to 12.25
Low phosphorus melting stock	20.50
Iron car axles	25.50 to 26.00
Steel car axles	18.00 to 18.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	13.50 to 14.00
Machine-shop turnings	9.25
Old carwheels	15.00 to 15.25
Cast-iron borings	9.25
*Sheet bar crop ends	18.50 to 18.75
No. 1 railroad wrought scrap	19.25 to 19.50
Heavy steel axle turnings	12.00 to 12.25
Heavy breakable cast scrap	14.00 to 14.50

*Shipping point.

The United Steel Company, Canton, Ohio, last week placed in operation two of its 80-ton open-hearth furnaces in plant B and its new Lamberton mill and 8-in. continuous bar mill in plant A.

Chicago

CHICAGO, ILL., June 14, 1916. (*By Wire.*)

The market is no longer rampant, a moderating of its extravagant phases being in progress. Except as to plates, the conditions which have made possible premium prices for prompt delivery are disappearing. The check which impossible prices and deliveries placed upon new business is bringing an adjustment of the disparity between the staggering accumulation of unfilled orders and mill output, and consumers are now beginning to receive against their contracts the materials necessary to meet their immediate needs. Though mill conditions will continue to sustain a high level of prices, a broader market with a release for some business that has been held back appears to be in sight. Structural steel has been selling at 2.50c., Pittsburgh, for prompt shipment, and reinforcing bars, for which 3.50c. was asked a few weeks ago, are now quoted at 2.75c., also for prompt shipment. Of interest in the week's business are a sale of 5000 tons of Bessemer rails, the renewal of interest in car buying, the ordering of 2500 tons of steel for a Peoria, Ill., steel plant and 3000 tons for the new mill at Indiana Harbor. For reinforced concrete work at Los Angeles, 7000 tons of bars will be required. Inquiry for Bessemer pig iron from abroad approximates 40,000 tons, and a sale of 7500 tons is noted, the price being on a basis slightly under $20.50 in the Valley. Local inquiry includes 3500 tons of foundry iron and 15,000 tons of basic.

Pig Iron.—The apathy of the pig-iron market is somewhat brightened by the important inquiry for Bessemer iron for export and for one or two sizeable lots for large domestic consumers, but melters generally are showing little or no interest in further purchases. Inquiry for steel-making iron will total approximately 40,000 tons and 7500 tons has already been sold at Chicago at a price slightly under $20.50 at the valleys. A manufacturer of railroad equipment is in the market for 3500 tons of foundry iron, and the still unsatisfied inquiries of the leading steel foundry interest are estimated at 15,000 tons. Weakness in Southern iron is more in evidence, and $14.50 for spot shipment has been done. The Northern market is unchanged. Some inquiry for charcoal iron is noted. Shipments from Northern furnaces continue to be held back because of the curtailment of foundry operations where labor difficulties and shortage are being encountered. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.50
Northern coke foundry, No. 2	19.00
Northern coke foundry, No. 3	18.50
Southern coke, No. 1 f'dry and 1 soft	$19.25 to 19.75
Southern coke, No. 2 f'dry and 2 soft	18.75 to 19.00
Malleable Bessemer	19.50
Basic	19.00 to 19.50
Low phosphorus	34.00 to 36.00
Silvery, 8 per cent	31.50
Bessemer ferrosilicon, 10 per cent	33.50 to 35.50

(*By Mail*)

Rails and Track Supplies.—With the limited buying of Bessemer rails last week, which included one lot of 5000 tons for the Southern Railway for delivery in the coming winter, the full rolling capacity of both Bessemer and open-hearth has been absorbed. Reports are current of some instances of concessions from prices for spikes in other territories than this, but local conditions appear unchanged in their firmness. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—The structural situation has developed a number of interesting phases which may be the marks of a period of transition which will make

possible the renewal of some projects that have been deferred. Users of structural steel no longer appear concerned regarding material for the future and, in fact, at least three or four fabricators either bought so liberally for the first half or found their business falling so far short of expectations as to permit them to merchandise a considerable portion of their supply. In these instances and also in the case of an Eastern steel company which appears to have had a stock of steel at Chicago on consignment, structural material for prompt shipment has been offered on the basis of 2.50c., Pittsburgh. From other mills, some of whom, not long since, were asking as much as 3.50c. for prompt shipment, structural steel may be had at 2.75c., Pittsburgh. There are indications that the car builders are taking cognizance of the more favorable situation. Last week orders for 1500 box cars were placed, of which the Baltimore & Ohio bought 1000, 500 each from the Haskell & Barker Car Company and the American Car & Foundry Company. The Baltimore & Ohio is also in the market for 1000 underframes, and those who are figuring upon them expect the buying for Russia of 5000 cars which were reported to have been ordered as wood cars, within two weeks. The New York Central Lines are also understood to have in mind the purchase of 5000 cars. The placing of the 2500 tons of steel for the new steel plant of the Keystone Steel & Wire Company, Peoria, Ill., with the Decatur Bridge Company has just been announced. Other small contracts of about 100 tons each were taken by the American Bridge Company and the Wisconsin Bridge & Iron Company, the American Bridge Company also securing 270 tons of bridge steel for the Wabash Railroad. The only project of size still to be placed in the immediate future is the 3000 tons for the new mills of the Mark Mfg. Company. It is expected that Bethlehem shapes will take up about one-half of the tonnage, the remaining standard shapes being secured for prompt shipment from various sources. We quote for Chicago delivery of structural steel from mill, 2.689c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—Prices for plates still range up to 4c., Pittsburgh, for prompt shipment, but the amount of this business is naturally very small and apparently decreasing. We quote for Chicago delivery of plates from mill on contracts 3.089c., and for prompt shipment 3.939c. to 4.189c.

We quote for Chicago delivery of plates out of jobbers' stock 3.50c.

Sheets.—Last week was but a repetition of the preceding week with respect to sheets, the demand being for heavier gages and special finishes. The automobile business is a sustaining factor in the demand. Lower prices for galvanized and one-pass sheets appear, as yet, to be no special inducement to new business. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.939c. to 5.039c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5.40c. to 5.50c.

Cast-Iron Pipe.—The leading interest has been awarded 400 tons of pipe for Decatur, Ill., and is the low bidder on 1100 tons at St. Paul. The only important inquiry for the coming week calls for 800 tons for Kansas City, Mo. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $33.50 to $34; 6 in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Bars.—Sales of bar iron have noticeably declined in volume; and while some of the mills have orders on their books running 10 weeks into the future, there has appeared a greater latitude in their views as to price, particularly for material to be rolled at once. The demand for rail-carbon bars has also fallen off, and reports of sales into this territory at slight concessions are noted. The predominance of specifications for the smaller sizes of bars has made the larger sizes especially desirable to the mills. There are a number of inquiries for reinforcing bars in quantity, one lot of 7000 tons for a Los Angeles viaduct being conspicuous. We quote, mill shipment, Chicago, as follows: Bar iron, 2.35c. to 2.50c.; soft steel bars, 2.689c.; nominal on contracts, 3.18c. for prompt shipment; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c., base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 10 per cent above list.

Rivets and Bolts.—From the trade in general there is very little demand for bolts and nuts, but the automobile industry appears insatiable and one current inquiry calls for 22,000,000 bolts and 20,000,000 nuts. This inquiry calls for shipment in the four months ending with October, and already some manufacturers have signified their inability to quote. Some sales have been made on the basis of the last advance in prices, but the long deliveries quoted by most makers prevent a thorough test of the acceptance of this high level by the trade. We quote carriage bolts up to ⅜ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼ in., 3.50c. to 3.75c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to ⅜ x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to ⅜ x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 65.

Old Material.—With every purchase of scrap by a consumer a lower price appears to be established. There is practically no selling, those having scrap to dispose of finding it impossible to move cars on track rapidly enough to avoid car service even at concessions in prices. The sacrificing of scrap has brought particularly sharp declines in rerolling and short rails, iron car axles and railroad wrought. Stove plate is exceedingly difficult to sell as the result of congestion and accumulation at consumers' works. The spread between scrap prices and finished materials, such as bar iron and rail-carbon steel, has never been wider. The Illinois Central Railroad disposed of a list of 5500 tons of scrap at very low prices, and the Chicago, Milwaukee & St. Paul is offering about 2700 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton
Old iron rails	$18.00 to $18.50
Relaying rails	19.50 to 20.50
Old carwheels	12.75
Old steel rails, rerolling	15.75 to 16.00
Old steel rails, less than 3 ft.	15.50 to 15.75
Heavy melting steel scrap	14.75 to 15.25
Frogs, switches and guards, cut apart	14.75 to 15.25
Shoveling steel	13.75 to 14.25
Steel axle turnings	9.75 to 10.25
	Per Net Ton
Iron angles and splice bars	$18.25 to $18.75
Iron arch bars and transoms	19.50 to 20.00
Steel angle bars	13.75 to 14.25
Iron car axles	22.50 to 23.00
Steel car axles	22.75 to 23.25
No. 1 railroad wrought	15.00 to 15.25
No. 2 railroad wrought	13.75 to 14.00
Cut forge	13.75 to 14.00
Pipes and flues	10.75 to 11.00
No. 1 busheling	12.25 to 12.75
No. 2 busheling	8.50 to 8.75
Steel knuckles and couplers	14.75 to 15.25
Steel springs	15.25 to 15.75
No. 1 boilers, cut to sheets and rings	9.25 to 9.75
Boiler punchings	13.50 to 14.00
Locomotive tires, smooth	20.00 to 20.50
Machine shop turnings	5.75 to 6.25
Cast borings	5.75 to 6.25
No. 1 cast scrap	11.75 to 12.25
Stove plate and light cast scrap	9.75 to 10.25
Grate bars	10.25 to 10.50
Brake shoes	10.00 to 10.50
Railroad malleable	11.75 to 12.25
Agricultural malleable	10.75 to 11.25

Wire Products.—An entirely routine situation prevails in the wire trade. The mills are still considerably behind their contract shipment schedules for wire nails and plain wire, and also wire rods. New sales, other than the periodic contracting, are without feature. W

quote as follows: Plain wire, No. 8 and coarser, base, $2.639; wire nails, $2.689; painted barb wire, $2.839; galvanized barb wire, $3.539; polished staples, $2.839; galvanized staples, $3.539, all Chicago.

Philadelphia

PHILADELPHIA, PA., June 13, 1916.

The feature of the market is easily what has been termed the violent foreign inquiry for billets, plates and pig iron, which the trade has under consideration to the extent of thousands of tons. New domestic business in steel products is generally reported to be quieter. In pig iron the only activity has been in steel-making grades, one lot of 15,000 tons of Lebanon low phosphorus having been taken in the week. The effort to induce business is bringing out lower prices for pig iron. Prompt ferromanganese is easier because of offerings of domestic material. The old material market continues as dull as ever, and prices are lower.

Pig Iron.—Interest is almost entirely confined to steel-making iron, one or two round lots of which have been purchased in the past week, while inquiries indicate further business, some for export. An Eastern steel company closed for 15,000 tons of Lebanon low phosphorus, last half delivery, the quotation for which is now $29 to $31, furnace, a recession of $1. It is pretty well understood that the basic recently purchased by a steel company in the East amounted in the aggregate to 22,000 tons, in two lots—12,000 and 10,000 tons. For the latter quantity $20, delivered, was paid, and for the former considerably less, the seller in this case being another steel company. A structural mill closed for 1000 tons of basic, and inquiry is out for a lot of moderate size to be delivered to a small plant which recently changed hands. Inquiry is being made also for 5000 tons required by a Canadian steel company. The makers of standard low phosphorus continue to be chiefly concerned with deliveries. It is to be noted that a point has been reached where consumers can be given what they want, whereas a few weeks ago the shipments requested were invariably cut down. Not only are the producers in a better position to ship, but the inadequate supply of labor has reduced the amount of iron which consumers can handle. Foundry iron is extremely dull, with business confined to small lots. While there is hardly enough doing to test the strength of the market, it is admitted that concessions are currently made. For eastern Pennsylvania No. 2 X the general minimum quotation is $20.25, delivered, but $20 can be done. A large block of No. 2 plain is being pressed for sale, and it is believed a low price would be accepted. The foreign inquiry for special Bessemer, and other iron conforming to foreign standards, continues to accumulate, and some business has been done. Several thousand tons are waiting for bottoms. A freight rate of $30 to Genoa, Italy, is now procurable. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$20.00 to $20.50
Eastern Pa., No. 2 plain	19.75 to 20.25
Virginia, No. 2 X foundry	21.25
Virginia, No. 2 plain	20.75
Gray forge	19.50
Basic	19.75 to 20.25
Standard low phosphorus	34.00 to 35.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended June 10 consisted of 16,655 tons from Sweden and 4150 tons from Chile.

Ferroalloys.—The market for prompt 80 per cent ferromanganese is easier because of offerings by domestic producers at lower prices. Some will accept $225, seaboard. Sellers of English material are not much disturbed over the situation, inasmuch as few of them have any prompt to offer. They quote $175, seaboard, for first quarter, and $200 for the last quarter of this year. Last week 797 tons of English ferromanganese arrived at this port. Furnaces which were recently put on ferromanganese are running on spiegeleisen, but one, at least, expects to be running soon on high percentage ferromanganese. Contract ferrosilicon, 50 per cent, is unchanged at $83 to $85, Pittsburgh, according to quantity; 10 per cent is quoted at $34.44, delivered, and 11 per cent at $35.44.

Plates.—The tonnage, both booked and for which there is inquiry, continues to climb, and prices are strong. The domestic requirements, which alone are sufficient to overload the mills, are augmented by inquiries from abroad, one of the latter coming from a Canadian car company which wants 5000 tons. Except in the case of one mill, the minimum quotation is 4.159c., Philadelphia, and in the case of the exception it is 3.909c., Philadelphia. The mill which makes the lower quotation asks 4.159c., where deliveries are to be made in three or four weeks. Odd lots readily bring 5.50c., Coatesville.

Bars.—Bessemer steel bars are quoted at 2.909c., Philadelphia, open-hearth bars ranging higher. Reinforcing bars are easier, it being reported that business has been done at 2.759c., Philadelphia. Iron bars are unchanged at 2.659c., Philadelphia, carload lots. More or less uncertainty as to prices of steel bars is discerned.

Structural Material.—The situation shows but slight change, except that new business is possibly a little lighter. An eastern Pennsylvania maker continues to quote 3.159c., Philadelphia. Another maker quotes shapes of Bessemer steel at 2.909c. to 3.159c., Philadelphia.

Billets.—Open-hearth rerolling billets are unchanged at $50, and forging steel at $65. The demand from abroad is very heavy. The production of discarded shell steel in blooms, or other unfinished form, is considerably in excess of the demand, but discards from the finished rounds find a ready market as a rule.

Sheets.—The minimum now quoted for No. 10 blue annealed sheets is 4.159c., Philadelphia, a quotation based on the sold-up condition of the principal Eastern producer.

Coke.—Renewed interest has been shown in contract furnace coke and some business has been done within the range of $2.50 to $2.75 per net ton at oven. Prompt furnace is held at $2.75. Foundry coke is quiet, but a good movement is looked for in July. Prompt foundry is quoted at $3.25 to $3.50 per net ton at oven and contract at $3.50. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The unsatisfactory condition of the market continues, no one seeming to want scrap unless an unusual bargain is offered. Inquiry for low phosphorus is the exception, and that is coming from abroad. Prices are lower on most commodities. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$15.50 to $16.00
Old steel rails, rerolling	18.00 to 19.00
Low phos. heavy melting steel scrap	22.50 to 23.25
Old steel axles	26.00 to 27.00
Old iron axles	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	16.50 to 17.00
No. 1 railroad wrought	20.50 to 21.00
Wrought-iron pipe	12.75 to 13.25
No. 1 forge fire	14.25 to 14.75
Bundled sheets	14.50 to 15.00
No. 2 busheling	10.50 to 11.00
Machine shop turnings	8.50 to 9.00
Cast borings	10.00 to 10.50
No. 1 cast	16.50 to 17.00
Grate bars, railroad	12.50 to 13.00
Stove plate	12.50 to 13.00
Railroad malleable	14.00 to 14.50

Cincinnati

CINCINNATI, OHIO, June 14, 1916.—(*By Wire.*)

Pig Iron.—Southern furnace prices are under a heavy strain on account of competition from resale iron. It is stated that the tonnage of certificate iron on the market has been somewhat exaggerated, as a number of sellers have been soliciting offers on the same lots. The open furnace quotation is $15, Birmingham basis, for this year's shipment, but it is conceded that $14.50 can now be done. The scarcity of sales of either resale or furnace iron in this territory makes it difficult to name a minimum selling price. Numerous rumors are afloat, and lower than $14, Birmingham basis, is said to be acceptable for some warrant iron. The extra expense involved, together with a disinclination of melters to purchase resale iron, has curtailed sales. Northern

foundry iron has not responded to the weakness in the Southern market, the furnaces asking $19, Ironton, for any shipment up to July 1 next year. Some resale iron is still available at $18.50 for movement this year. It is also somewhat interesting to note that the Jackson County silvery irons are yet firm at $27 at furnace for an 8 per cent analysis in the face of competition from Southern high silicon irons that can be delivered at many competitive points much below the price of Northern irons. A sale of 1000 tons of Lake Superior charcoal iron was made to a Michigan melter for last half shipment. The carload foundry business for filling in is smaller than at any time within the past 12 months. An inquiry is out for 4000 tons of foundry iron and 500 tons of malleable from Pittsburgh for first half shipment. A melter in the Chicago district is also inquiring for 300 tons of foundry iron for shipment this year. It is reported that this melter wants a high silicon iron. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.90 to $18.40
Southern coke, No. 2 f'dry and 2 soft	17.40 to 17.90
Southern coke, No. 3 foundry	16.90 to 17.40
Southern coke, No. 4 foundry	16.40 to 16.90
Southern gray forge	15.90 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Finished Material.—New business with the local warehouses is fairly good. High prices have to some extent cut off the large demand for different classes of building material, but the demand for small lots is holding up better than was expected. Jobbers as a rule are able to make quicker deliveries than the mills, and in some cases their prices are as low as those quoted by the manufacturers. We quote from stock, No. 10 blue annealed sheets, 3.50c.; small structural shapes, 3.20c.; wire nails, $2.75 per keg, base, and barb wire, $3.60 per 100 lb. The jobbers' discount on the smaller machine bolts is unchanged at 60 per cent off list, and the larger sizes 40 and 10 and 5 per cent off; carriage bolts, smaller sizes, 50 and 10 and 5 per cent off; larger sizes, 40 and 5 per cent. The mill price of No. 28 galvanized sheets is unchanged at 5c., Cincinnati or Newport, Ky., and No. 28 black sheets at 3c. to 3.15c.

Old Material.—Further reductions have been made in prices and it is difficult to ascertain what the average quotations should be on practically all kinds of scrap. The mill consumers are buying sparingly, and the foundries are also only taking small lots as needed from time to time. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$11.50 to $12.00
Old iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.75 to 15.25
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.25 to 13.75

Per Net Ton

No. 1 railroad wrought	$13.25 to $13.75
Cast borings	5.25 to 5.75
Steel turnings	5.50 to 6.00
Railroad cast scrap	11.00 to 11.50
No. 1 machinery scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.75
Iron axles	20.25 to 20.75
Locomotive tires (smooth inside)	18.00 to 18.50
Pipes and flues	9.75 to 10.25
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	8.50 to 9.00

Coke.—The labor shortage has curtailed production to some extent and this has had a steadying effect on prices. Little new contracting for either furnace or foundry coke is reported, only small lots for emergency purposes being bought. Shipments on contracts are going forward at a satisfactory rate, in spite of the labor situation, and cars in which to transport coke are more plentiful. We quote Connellsville furnace coke for prompt shipment at $2.25 to $2.50 per net ton at oven and on contract from $2.50 to $2.75. Foundry coke ranges from $3 to $3.50. Wise County and Pocahontas producers are still holding for an average of 25c. per ton above the figures named. New River foundry coke is stationary around $4 at oven.

Cleveland

CLEVELAND, OHIO, June 13, 1916.

Iron Ore.—A new record is being set in ore shipments. The majority of Lake vessels are being used in the ore trade. Many of the big carriers are going up light and some are making the round trip from the head of the Lakes in a week. Outside of some delay by fogs, conditions are very satisfactory for a heavy movement and it is believed that June shipments will exceed 9,000,000 tons. One large shipper has come in the market for a wild tonnage at the current rate of $1 per ton from the head of the Lakes, and the demand at the advanced rate is fairly active. We quote prices as follows: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—Practically no sales or inquiries are reported in this territory, but a few inquiries for last half iron have come from the East. Ohio foundries are showing no interest in iron for next year and few consumers have so far covered for that delivery. May shipments from merchant furnaces in Central Western territory exceeded those of April and exceeded the May production, so there has been some further reduction of stocks in furnace yards. Prices on Northern iron are unchanged at $18.50 to $19, at furnace, for No. 2. Southern iron is inactive. Resale Southern iron can be had at about $14.75, Birmingham. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
Basic	$18.95 to 19.30
Northern No. 2 foundry	19.00 to 19.30
Southern No. 2 foundry	18.75 to 19.50
Gray forge	18.75
Jackson Co. silvery, 8 per cent. silicon	28.62 to 30.62
Standard low phos., Valley furnace	32.00

Coke.—Foundries are practically all under contract for the remainder of the year and the new demand is light. Prices are unchanged at $3 to $3.25 per net ton at oven, for best grades of Connellsville foundry coke for prompt shipment and $3.25 to $3.50 for last half contracts. Standard Connellsville furnace coke is quoted at $2.75 for last half.

Finished Iron and Steel.—Considerable new inquiry has come out for steel bars for export, much of which is for soft steel wanted for other purposes than for shells. One of these inquiries is for 6000 tons of large soft steel rounds. These inquiries are from New York brokers. The demand for contracts is more active than for several weeks, and considerable business has been closed for last half requirements at 2.50c., Pittsburgh, for steel bars and structural material and 2.90c. for plates. There is a fair demand for steel bars and structural material for early shipment, which are selling at 2.75c. to 3c., Pittsburgh, for Bessemer steel. Bridge shops are not very busy and some are offering resale structural material from stock at 2.80c. to 3.25c. Owing to the inactivity in a few boiler shops, some of these are allowing the cancellation of plate tonnage contracted for at prices considerably below those now prevailing. Local plate prices are unchanged at 3.50c. to 4c., Pittsburgh. The only new structural contract reported is 165 tons for an addition to the plant of the Canton Steel Foundry Company, Canton, Ohio, taken by the Massillon Bridge & Structural Company. Considerable rejected shell steel is being offered in billets but many of the forge shops are unable to use this because of the high carbon. A market may be found for some of this steel for reinforcing bars and other purposes. Plants not having mills available for rerolling find that other mills are asking the practically prohibitive price of $20 a ton for rerolling. Bar iron is in fair demand and firm at 2.50c., Pittsburgh. Black sheets in light gages and galvanized sheets are in slack demand and the latter are weak, selling as low as 4.65c., at mill, for less than carload lots. We quote sheets at 2.90c. to 3c., at mill, for No. 28 black; 3c.

to 3.25c. for No. 10 blue annealed, and 4.65c. to 4.75c. for No. 28 galvanized. Warehouse business continues fairly good. We quote stock prices at 3.25c. for steel bars and structural material, 3.65c. for plates and 3.20c. for iron bars.

Bolts, Nuts and Rivets.—The demand for bolts and nuts continues active although not so heavy as a few weeks ago. Consumers are now mostly under contract for the third quarter. The demand for rivets is fairly active and contracts for third quarter and last half are being closed at regular prices, which are 4c., Pittsburgh, for structural rivets and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 50 and 10; cut thread, 50; larger or longer, 40; machine bolts with h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 10; square h. p. nuts, blank or tapped, $2.90 off the list; hexagon, h. p. nuts, blank or tapped, $2.90 off; c. p. c. and t. square nuts, blank or tapped, $2.60; hexagon nuts, all sizes, $3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Old Material.—The market shows further weakness. Borings, turnings and some other grades have suffered sharp declines. Heavy steel scrap is quoted down to $15.50, Cleveland delivery. The production exceeds the demand and considerable scrap is held on the tracks. Rolling mills are not taking much scrap and are placing no additional orders, causing a weakness in busheling which is quoted nominally by some dealers as low as $12.50. In spite of the general weakness the market shows signs of improvement, some demand having sprung up for heavy steel scrap for July and August deliveries. A few scattered sales are reported for those deliveries at some advance over the current prices. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Steel rails	$15.50 to $16.00
Iron rails	18.50 to 19.00
Steel car axles	28.00 to 29.00
Heavy melting steel	15.50 to 15.75
Carwheels	13.50 to 13.75
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	15.50
Steel axle turnings	12.00 to 12.25
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$23.00 to $24.00
Cast borings	6.00 to 6.25
Iron and steel turnings and drillings	6.25 to 6.50
No. 1 busheling	13.00 to 13.25
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	14.00 to 14.25
Railroad grate bars	9.00 to 9.50
Stove plate	10.00 to 10.25

Birmingham

BIRMINGHAM, ALA., June 12, 1916.

Pig Iron.—Operators are realizing that the market will do well to hold itself at $15. The present rate of production in Alabama is 2,750,000 tons per annum as compared with a prior high rate of slightly over 2,000,000 tons. While the production of basic has increased relatively more than that of foundry iron, the foundry production is enormously larger. With the prospect of additional stacks and with a softening market, the situation is not brilliant. Recent sales, both for forward as well as spot, by furnace operators seem to have been on a uniform level of $15. One or two large consumers are sounding the market for lots of as much as 10,000 tons, but they are in no hurry to close, which means that they are dickering for concessions. The largest sale reported was one of 500 tons for Philadelphia for June and July delivery at $15. Carload lots for the same delivery brought the same price. Large offerings would probably secure a quotation of $14.75 spot, while $15 to $15.25 is about as good as can be done for the rest of the year. The Woodward Iron Company has blown out a 400-ton stack for relining, but will blow in its small Vanderbilt stack. It is also prepared to start on basic at a 400-ton stack in July. There have been just enough requests to hold back shipments to direct attention to them. Shippers as a rule are taking the iron as ordered. Deliveries have been hampered by a car shortage, which is not severe but is felt in a spotted market. It is beginning to be apprehended that the high prices for steel products, causing the holding up of building operations, are, in turn, affecting the demand for pig iron. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	$15.50 to $15.75
No. 2 foundry and soft	15.00 to 15.25
No. 3 foundry	14.50 to 14.75
No. 4 foundry	14.25 to 14.50
Gray forge	14.00 to 14.25
Basic	15.00 to 15.50
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—Scattered orders from various sections keep the plants going at the same capacity as during the past several months. Prices have tended to ease somewhat, but there is no weakness. Sanitary pipe shops are maintaining a good schedule of operations, the best in some time. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—Coal dealers are pleased with the slight advances secured on recent contracts and the prospect of reacquiring territory wrested from Alabama several years ago. Blacksmithing coal is quite active. Coke continues strong. The output would be larger but for car shortages here and there. Prices are stiff. We quote, per net ton, f.o.b. oven, for standard beehive foundry, $4.25 to $4.50, the former price being for large contracts.

Old Material.—The scrap market has taken another backset and the consumer comes nearer naming his price than the dealer does. Wrought scrap and carwheels have dropped. Steel scrap is also lower. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$24.00 to $25.00
Old steel rails	11.00 to 11.25
No. 1 steel scrap	9.50 to 10.00
No. 1 wrought scrap	13.00 to 13.50
No. 1 cast scrap	11.00 to 11.50
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	10.00 to 10.50
Old carwheels	10.50 to 11.00
Tram carwheels	9.50 to 10.00

St. Louis

ST. LOUIS, June 12, 1916.

Pig Iron.—Demand is at a low ebb. There is a softening tendency in quotations, and holders of warrants are disposed to let go before a marked drop appears. Furnace representatives are under instructions to hold firmly because of the sold-up condition of the producers. Melters, being well supplied in yards and under contract, will not, it is believed, worry over prices until needs become a little sharper.

Coke.—Nothing of importance is occurring in the coke market, though this month and next are expected to bring out some renewals of old contracts expiring with June 30. There may be some competition of an interesting character, with by-product coke in the local market, but no developments are reported as yet of any sensational character. Prices are as last quoted.

Finished Iron and Steel.—Movement out of warehouse is about at capacity to handle—it could scarcely be greater than at present. For stock out of warehouse we quote as follows: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.30c.; No. 28 black sheets, cold rolled, one pass, 3.30c.; No. 28 galvanized sheets, black sheet gage, 5.55c. The Terminal Railroad Association, anticipating increased traffic in the fall, has placed an order with the American Locomotive Company for 12 high-powered switching engines of 100 tons each. The underframes are to be cast by the Commonwealth Steel Company, at Granite City, Ill.

Old Material.—The scrap market is completely shot to pieces, and all past efforts to hold prices up have proved unsuccessful. Steel mills, rolling mills and foundries are all refusing shipments, while rejections on inspection are reported the severest ever known. There is a little trading among dealers on small quantities. Price quotations are to a large extent representative of views of value, without any belief in ability to maintain them in real transactions. The lists out last week went at low prices, particularly the Wabash, 5000 tons, and the Vandalia, 2000 tons. No new lists have

come out, and the market is likely to prevent any heavy offerings. Consumers are working at top capacity, but their stocks are so large that no new supplies are needed. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$16.25 to $16.75
Old steel rails, re-rolling	15.25 to 15.75
Old steel rails, less than 3 ft	15.75 to 16.25
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	11.25 to 11.75
No. 1 railroad heavy melting steel scrap	15.00 to 15.50
Heavy shoveling steel	12.00 to 12.50
Frogs, switches and guards cut apart	14.25 to 14.75
Bundled sheet scrap	9.25 to 9.75

Per Net Ton

Iron angle bars	$15.25 to $15.75
Steel angle bars	12.75 to 13.25
Iron car axles	22.75 to 23.25
Steel car axles	24.00 to 24.50
Wrought arch bars and transoms	19.00 to 19.50
No. 1 railroad wrought	14.75 to 15.25
No. 2 railroad wrought	14.50 to 15.00
Railroad springs	13.25 to 13.75
Steel couplers and knuckles	13.25 to 13.75
Locomotive tires, 42 in. and over, smooth inside	18.25 to 18.75
No. 1 dealers' forge	10.25 to 10.75
Mixed borings	5.75 to 6.25
No. 1 busheling	12.25 to 12.75
No. 1 boilers, cut to sheets and rings	8.00 to 8.50
No. 1 railroad cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.25 to 8.75
Railroad malleable	10.50 to 11.00
Agricultural malleable	9.50 to 10.00
Pipes and flues	9.50 to 10.00
Railroad sheet and tank scrap	9.00 to 9.50
Railroad grate bars	8.25 to 8.75
Machine shop turnings	6.75 to 7.25

New York

NEW YORK, June 14, 1916.

Pig Iron.—Larger inquiries for domestic consumption aggregating 20,000 to 30,000 tons, together with increased foreign demand, estimated at not less than 50,000 tons, have taken the edge off the dullness which still dominates the market. While none of the domestic inquiries have yet resulted in orders, it is to be emphasized that they are nearly all for this year's delivery. One steel casting foundry is inquiring for 10,000 tons of basic iron, another large melter wants 10,000 tons of foundry and other grades, while a locomotive builder is figuring on 6000 to 7000 tons of foundry grades. A New Jersey melter contemplates buying 4000 to 5000 tons of malleable and high-silicon iron. Foreign demand continues to grow, but not to result in large orders. Italy leads, with inquiries of 20,000 to 30,000 tons, mostly Bessemer, while Russia, Scandinavia, Switzerland and Japan are also included. It is noticeable that other grades than Bessemer are more prominent in the needs of foreign countries. A sale of 2000 tons of low phosphorus iron to Japan has been made in the past week and 10,000 tons of Bessemer to Italy. Labor troubles continue to restrict the melt of foundry iron, which is generally regarded as weaker and lower with Bessemer strong and basic iron firm. We quote at tidewater for early delivery: No. 1 foundry, $20.50 to $21; No. 2 X, $19.75 to $20.25; No. 2 plain, $19.50 to $20; Southern iron at tidewater, $20.50 to $21 for No. 1 and $20 to $20.25 for No. 2 foundry and No. 2 soft.

Ferroalloys.—The absence of substantial inquiry for and sales of ferromanganese is more pronounced than ever, the market being lifeless. Increased importations and larger domestic production continue to ease the situation. Domestic ferromanganese for spot or near delivery is believed to be obtainable for $225 to $250, furnace, while the quotation for fourth quarter is $200, seaboard, and for 1917 delivery, $175, seaboard. Most British representatives are out of the market for this year's delivery. Electrolytic ferromanganese, understood to be of excellent composition and made by a far Western producer, is being offered in New York at $260. It is reported that four carloads are already here. Spiegeleisen is easier at $55 to $60 for last half, with little new demand. A cargo of 3100 tons of Cuban manganese ore is expected soon. Ferrosilicon, 50 per cent, continues strong and active, selling at $90 to $100 for early delivery, with the contract quotations still $83 to $85, Pittsburgh.

Structural Material.—Local building work is quiet. While architects are credited with having considerable work under consideration, much of this is regarded as due to the probable passage of new building zone laws for the city and plans are being filed in anticipation wherever feasible. Under the conditions it is not surprising that fabricators are here and there offering concessions to move plain material available under contracts expiring this month and at prices which are particularly attractive under present market conditions. No great weakness is likely to develop, it is believed, as the mills control the situation in the matter of steel prices. New railroad offerings include 1225 tons at Waverley, N. Y., for the Lehigh Valley; 200 tons for two bridges for the Norfolk & Western; 400 tons for the Maine Central at Portland; 200 tons for six bridges for the Boston and Albany, and 550 tons additional for the Pennsylvania. The American Bridge has taken a contract for 200 tons for the Central Railroad of New Jersey at Phillipsburg. The new projects in general building embrace 1200 tons for the Sun Shipbuilding Company, placed, it is thought, with Lewis F. Shoemaker & Co., who have also closed for 800 tons for the public service power plant at Springfield, Mass.; 700 tons for the Colonial Trust Company, Philadelphia; 400 tons for a Y. M. C. A. Building, Troy, N. Y.; 350 tons for the Pure Oil Company, Carroll Street, Brooklyn; 450 tons for a sugar plant in Cuba, said to have been awarded to the Virginia Bridge & Iron Company; 400 tons for a Masonic Temple at Schenectady; 300 tons for a building for Hoggson Brothers, Jackson, Mich.; 600 tons for a 12-story apartment for Bing & Bing; 500 tons for an apartment for J. J. Hearn, Fifty-fifth Street, and 500 tons for a Settlement house, Barrow Street. It is reported that the Lackawanna Bridge Company is to supply the transmission poles for the New York Connecting Railway, taking about 1500 tons. The factory building for Gould & Eberhardt, Newark, is to be of concrete. We quote mill shipments at 2.669c. to 3.169c., New York, depending on the urgency for delivery, and from warehouse at 3.25c. to 3.50c., New York.

Steel Plates.—A further round tonnage for shipbuilding in Japan has been sold for fourth quarter and first quarter deliveries at 4c., Pittsburgh, and two different domestic consumers have bought for the fourth quarter, also at 4c., for a total in the two cases of over 2000 tons. Owing to the quietness in structural buildings and in railroad cars, universal plates are, however, easier, and it is possible that an offering attractive to the mill might be placed at 3.50c., Pittsburgh, for delivery this year. We continue to quote mill shipments at 3.919c., New York, to 4.169c., but for such future business as the mills will consider, 2.919c., New York. Warehouse prices are 4c. to 4.50c., New York.

Iron and Steel Bars.—Foreign inquiry is the feature, and while much of it is nothing more than a feeling out for prices and deliveries, there is a breadth in kind and in the widely distributed foreign origin which is relied on to make good any falling off in domestic consumption. The renewal of these inquiries has resulted from the considerable reduction in ocean freight rates, which amount to 20, 30, and even 50 per cent, over recently prevailing rates. New buying has fallen off, but as yet specifications on contracts are sufficiently heavy that mills are not catching up on deliveries, and accordingly it is held that until orders on mills do decrease, there will be no noticeable easing up, not to mention the check against a rapid decline afforded by the foreign offerings. The bar iron situation appears to be strong, and while 2.50c., Pittsburgh, can be done, contracts with consumers for the last half and with the jobbers for the third quarter have been written at 2.60c., Pittsburgh. For mill shipments of iron bars we quote 2.669c., New York, and for steel bars, 2.669c. to 3.169c., New York, according to the urgency of delivery, with 2.919c., New York, as the market for largest lots for prompt shipment. From warehouse we quote iron and steel bars at 3.10c. to 3.50c., New York.

Cast-Iron Pipe.—No public lettings of importance are announced, but private buying continues in good

volume. Carload lots of 6-in., class B and heavier, are firmly held at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—Dullness pervades the market. Some movement is perceptible in a few classes of rolling-mill stock, but steel scrap is neglected. Eastern Pennsylvania steel companies are more critical than ever as to the quality of steel scrap received on contracts, and are rejecting freely. Brokers quote buying prices about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$12.50 to $12.75
Old steel rails (short lengths) or equivalent	13.50 to 14.00
Relaying rails	28.00 to 30.00
Rerolling rails	15.50 to 16.00
Iron car axles	26.00 to 27.00
Steel car axles (for domestic use)	28.50 to 29.00
Steel car axles (for export)	30.00
No. 1 railroad wrought	19.00 to 19.50
Wrought-iron track scrap	16.00 to 17.00
No. 1 yard wrought, long	15.00 to 15.50
No. 1 yard wrought, short	13.00 to 13.50
Light iron	5.50 to 6.00
Cast borings (clean)	8.25 to 8.50
Machine shop turnings	6.25 to 6.50
Mixed borings and turnings	6.50 to 7.00
Wrought pipe	10.50 to 11.00
Old carwheels	15.00 to 15.50
Malleable cast (railroad)	12.25 to 12.75

Cast scrap is inactive, foundries buying almost nothing. Dealers' quotations to consumers are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.50 to $17.00
No. 2 cast (heavy)	15.00 to 15.50
Stove plate	12.00 to 12.50
Locomotive grate bars	12.00 to 12.50

Buffalo

BUFFALO, N. Y., June 13, 1916.

Pig Iron.—Inquiry has been of good volume but actual buying has been small, although a large tonnage is under negotiation. Important users who have been out of the market for some months are now coming in for last half deliveries. The inquiry noted aggregates about 25,000 tons, including General Electric and American Locomotive business, and is comprised of about 8000 to 10,000 tons of foundry grades, some low phosphorus, 2000 tons or more of malleable and 10,000 tons of basic. Furnacemen believe that an additional number of consumers will soon be coming forward with inquiries, as most foundrymen are very busy, their sole handicap being the lack of sufficient labor. Furnaces are loaded with shipping orders and large tonnages are going out. Some producers have stiffened their prices, particularly for Nos. 1 and 2 X grades of foundry and malleable, and the price of basic is also a little higher. We quote as follows, f.o.b. furnace, Buffalo, for current and last half, with deliveries extending into first half of 1917:

No. 1 foundry	$19.50 to $20.00
No. 2 X foundry	18.50 to 19.50
No. 2 plain	18.50 to 19.00
No. 3 foundry	18.50 to 18.75
Gray forge	18.50
Malleable	18.50 to 19.50
Basic	19.50 to 20.00
Bessemer	21.00 to 22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Greater pressure is being made by consumers for deliveries on contracts placed in November and December, 1915, which they are anxious to get. There is not much movement among buyers looking to the placing of 1917 business; but some inquiry is noted for first quarter, particularly for bars. Current business is closely confined to immediate specification for shipment at mills' convenience, which will be six to seven months hence. Bids are soon to be called for on 300 tons of reinforcing bars for a plant addition for the F. F. Dalley Company, Ltd., Buffalo.

Old Material.—Prices have sagged 50c. to $1 per ton, occasioned largely by still further embargoes on the receipt of material at some of the principal consuming points, thus throwing on the market scrap, which dealers are selling at sacrifice prices in order to save demurrage charges. These prices are considered much below normal, taking into account the busy condition of the mills. We quote current asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	$15.50 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	24.00 to 24.50
Iron axles	24.00 to 24.50
Carwheels	13.50 to 14.00
Railroad malleable	15.00 to 15.50
Machine shop turnings	7.00 to 7.50
Heavy axle turnings	12.00
Clean cast borings	8.00 to 8.25
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

British Steel Market

American Billets and Wire Rods Sold to France—Pig Iron Scarcer

LONDON, ENGLAND, June 14, 1916.—(*By Cable*)

The pig-iron scarcity is intensified, with permit difficulties unrelaxed. The embargo to neutrals is strict, but a substantial increase in production is expected soon. France has purchased American billets and blooms for June and July delivery at about £17 c.i.f., and also wire rods at £22 c.i.f. Tin plates are irregular at 36s. 6d. Welsh bars are nominal at £14. Quotations, mostly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 36s. 6d., against 37s. a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.

Hematite pig iron, f.o.b. Tees, about 140s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £14 nominal, against £12 10s. last week.

Steel bars, export, f.o.b. Clyde, £18 5s.

Ferromanganese, £40 to £45 nominal.

Ferrosilicon, 50 per cent, c.i.f., £29.

Less Wire Buying for National Forests

WASHINGTON, D. C., June 13, 1916.—The Forest Service of the Department of Agriculture announces that with bids for furnishing wire recently advanced 45 per cent, and prices on other equipment considerably increased, material curtailment of telephone line construction in the national forests this summer is in prospect. There are over 20,000 miles of telephone line in the national forests and approximately 2000 miles of new line was planned for the coming season.

A certain amount of wire is required also for upkeep, since the lines are peculiarly subject to breakage from falling trees and similar causes. Every spring the forest rangers have to get the lines in order in preparation for the fire season and although, to lessen the effects of accident, the wires are mostly run on swinging insulators suspended from the trees, in the aggregate a large number of repairs must be made. Notwithstanding the number of telephone lines already built, large areas are still without means of communication and consequently lacking in proper equipment for fire protection. Not only are the telephones used by the forest officers, but they are a great convenience to the public. Very often, it is said, they enable isolated settlements to have a means of communication which they could secure in no other way. W. L. C.

The Morton B. Smith Company, 241-243 Front Street, New York, for many years prominent in the trade in old metals and scrap iron and steel, announces that it has decided to discontinue its iron and steel department. Attention will hereafter be given exclusively to old metals, and the scope of the business in this direction will be enlarged. After existing contracts involving scrap iron and steel have been liquidated, a new company will be formed to handle such material under the control of William Vander Koogh, who has been in charge of this department.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast, 65c. on plates, structural shapes, iron and steel bars, pipe and boiler tubes, tin plates, nails, spikes and wire. The foregoing rates to the Pacific coast are by rail only.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 2.90c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Following are extras prescribed by manufacturers:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel. Special extras and prices given on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., including 3/16 in., up to 72 in., inclusive	.10
Lighter than ¼ in., including 3/16 in., over 72 in. to 84 in. (extra for width)	.20
Lighter than ¼ in., including 3/16 in., over 84 in. to 96 in. (extra for width)	.30
Lighter than ¼ in., including 3/16 in., over 96 in. to 100 in. (extra for width)	.40
Lighter than ¼ in., including 3/16 in., over 100 in. to 102 in. (extra for width)	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide, inclusive	.15
Lighter than 3/16 in., including No. 8, over 72 in. to 84 in. (extra for width)	.25
Lighter than 3/16 in., including No. 8, over 84 in. to 96 in. (extra for width)	.35
Lighter than No. 8 and including No. 10, up to 60 in. wide	.30
Lighter than No. 8 and including No. 10, over 60 in. wide to 64 in.	.35

Up to 72 in. wide, ordered not less than 10.2 lb. per sq. ft. will be considered ¼ in. plate.
Over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in. wide, ordered to weight of 3/16 in., take No. 8 price.
Over 72 in. wide, ordered to weight of No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.

Sketches, not over four straight cuts, inc. straight taper plates	.10
Sketches having more than four straight cuts	.20

Plates sheared to a radius take complete circle extras.

Wire Rods.—Bessemer, open-hearth and chain rods, $55 to $60.

Wire Products.—Prices to jobbers, effective May 1: Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.45; galvanized, $3.15. Galvanized barb wire and staples, $3.35; painted, $2.65. Wire nails, $2.50 to $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from April 21, 1916, on black and galvanized steel and iron pipe, all full weight.

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	63	30½	⅛ and ¼	52	19
½	67	46½	⅜	53	20
¾ to 3	70	50½	½	57	33
			¾ to 1½	60	38

Lap Weld

2	65	45½	1¼	48	26
2½ to 6	68	48½	1½	54	33
7 to 12	65	44½	2	55	34
13 and 14	53½	..	2½ to 4	57	37
15	51	..	4½ to 6	57	37
			7 to 12	56	36

Reamed and Drifted

1 to 3, butt	68	48½	¾ to 1½, butt	55	32
2, lap	63	43½	1¼, lap	43	20
2½ to 6, lap	66	46½	1½, lap	49	27
			2, lap	50	28
			2½ to 4, lap	52	31

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	35½	⅛, ¼ and ⅜	52	29
½	64	45½	½	57	38
¾ to 1½	68	49½	¾ to 1½	61	40
2 to 3	69	50½			

Lap Weld, extra strong, plain ends

2	63	44½	1¼	50	28
2½ to 4	66	47½	1½	55	34
4½ to 6	65	46½	2	57	37
7 to 8	61	40½	2½ to 4	59	40
9 to 12	56	35½	4½ to 6	58	39
			7 to 8	52	33
			9 to 12	47	28

Butt Weld, double extra strong, plain ends

½	55	38½	½	44	26
¾ to 1½	58	41½	¾ to 1½	47	29
2 to 2½	60	43½			

Lap Weld, double extra strong, plain ends

2	55	38½	1½	44	25
2½ to 4	57	40½	2	44	25
4½ to 6	56	39½	2½ to 4	46	30
7 to 8	51	30½	4½ to 6	45	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets, of U. S. standard gage, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.20
Nos. 9 to 10	3.00 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.75 to 2.85
Nos. 25 and 26	2.80 to 2.90
No. 27	2.85 to 2.95
No. 28	2.90 to 3.00
No. 29	2.95 to 3.05
No. 30	3.15 to 3.25

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.75 to 3.85
No. 12	3.85 to 3.95
Nos. 13 and 14	3.85 to 3.95
Nos. 15 and 16	3.95 to 4.05
Nos. 17 to 21	4.10 to 4.20
Nos. 22 and 24	4.20 to 4.30
Nos. 25 and 26	4.35 to 4.45
No. 27	4.60 to 4.70
No. 28	4.75 to 4.85
No. 29	4.90 to 5.00

Boiler Tubes.—Discounts on less than carloads, f.o.b. Pittsburgh, freight to destination added, on lap-welded steel tubes and standard charcoal-iron tubes, effective from April 15, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1½ in.	35	1½ in.	27
1¾ and 2 in.	47	1¾ and 2 in.	39
2¼ in.	44	2¼ in.	36
2½ and 2¾ in.	50	2½ and 2¾ in.	42
3 and 3¼ in.	55	3 and 3¼ in.	47
3½ to 4½ in.	56	3½ to 4½ in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.

1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
June	Lake	lytic	York	York	Louis	York	Louis
7	28.25	28.00	44.50	7.00	6.75	13.62½	13.37½
8	28.25	28.00	44.87½	7.00	6.75	13.75	13.50
9	28.25	28.00	44.87½	7.00	6.75	13.62½	13.37½
10	28.25	28.00	.....	6.85	6.70	13.62½	13.37½
12	28.25	28.00	44.00	6.85	6.70	13.50	13.25
13	28.00	27.75	43.25	6.85	6.70	13.50	13.25

NEW YORK, June 14, 1916.

Copper is dull and easier. Tin is quiet, plentiful and lower. Lead is inactive and quotations are being shaded. Spelter is quiet and weak again. Antimony is demoralized.

New York

Copper.—The market continues dull, and all prices are nominal. The producers are supposed to be holding to their quotations of a few weeks ago, but second hands would sell at considerably less. They are making the market. There would be little difficulty to-day in obtaining round lots of electrolytic for early delivery at 27.75c. to 28c., cash, New York, and it is probable that small lots could be had around 27.50c. Lake is nominally quoted at about 28c., but is as inactive as electrolytic. The London market for electrolytic declined £1 to £141 yesterday. There are rumors that large British buying is pending but they lack confirmation of any sort. As for copper products, it seems clear that foreign buyers are through paying the premium prices at which business was done a few weeks ago. When quotations on sheets and rods have been submitted to English firms they have replied that they can do better in London. A case is cited where brass billets were offered at 22c. and brought forth the statement from an English firm that it could buy at home for 17c. Brass turnings enter largely into such billets. In the matter of domestic business, the mills are proceeding very cautiously, some of them going so far when quoting as to urge conservatism on the part of buyers. They will accept no cancellations, and rather than have the danger of such a contingency arise, they prefer to take orders for practically current needs only. The exports this month, including yesterday, total 14,057 tons.

Tin.—In the week there has not been one good day, and the tendency of the market has been heavy. Efforts to attract buyers by offerings at lower prices have merely caused them to become even more wary. There is plenty of tin here, including a generous supply of Banca, and recent fears of inability to ship from London because of threatened difficulty in getting licenses seem to have been without much real foundation. Banca tin is free of any license restriction and sells at ¾c. to 1c. under Straits. The latter was quoted yesterday at 43.25c. The arrivals this month total 2510 tons and there is afloat 3102 tons.

Lead.—The market has been dull and sagging and the nominal prices have been made by independent sellers. The New York quotation yesterday was 6.85c., but it is believed that 6.80c. would be accepted. The St. Louis price is down to 6.70c. The exports this month, including yesterday, total 1152 tons.

Antimony.—The market is demoralized. Chinese and Japanese grades can be easily had at 20c., although it is not long since 45c. was the quotation. One explanation ventured for the decline is that less antimony is being used for shrapnel bullets, shrapnel having been largely supplanted by high explosive shells.

Aluminum.—No. 1 virgin aluminum, 98 to 99 per cent pure, is steady and a little stronger at 59c. to 60c.

Spelter.—The good movement of last week has entirely petered out, and yesterday early shipment was to be had at 13.50c., New York, and 15.25c., St. Louis. July is quoted at about 13c., St. Louis; September at 12c., and October at 11.50c. The base price of sheet zinc has been lowered to 20c. There is some belief that the British Government is endeavoring to depress the market, not only in spelter but in other metals as well. The London market is weak and yesterday it dropped £2 to £68 for prompt metal, the decline making sellers here more than ever anxious to sell. The exports of this month, including yesterday, total 2065 tons.

Old Metals.—The market continues unsettled. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	25.00 to 26.00
Copper, heavy and wire	24.50 to 25.50
Copper, light and bottoms	20.00 to 21.00
Brass, heavy	14.50 to 15.00
Brass, light	11.50 to 12.50
Heavy machine compositions	18.00 to 18.50
No. 1 yellow rod brass turnings	14.50 to 15.50
No. 1 red brass or composition turnings	15.00 to 16.00
Lead, heavy	6.25
Lead, tea	5.75
Zinc	9.50 to 10.50

Chicago

JUNE 12.—Lacking any demand, metals are lower. We quote: Casting copper, 26c.; Lake copper, 28.25c.; tin, carloads, 44.50c., and small lots, 46.50c.; lead, 6.85c.; spelter, 13.75c.; sheet zinc, 21c.; Cookson's antimony, 50c.; other grades, 23.50c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 20.50c.; copper bottoms, 18.50c.; copper clips, 20c.; red brass, 17c.; yellow brass, 12.50c.; lead pipe, 5.50c.; zinc, 10c.; pewter, No. 1, 27c.; tinfoil, 33c.; block tin pipe, 37c.

St. Louis

JUNE 12.—The market for non-ferrous metals has been rather easy. The close to-day was: Lead, 6.95c. bid, 7c. asked; spelter, 13c. for June and 13.25c. for July shipment; tin, 47c.; Lake copper, 30c.; electrolytic copper, 29.50c ; antimony, Asiatic, 29c. In the Joplin ore district top grades of zinc blende sold at $90 per ton, with premium settlements at $92.50, while the second grades ranged no lower than $70, with the average of the week's sales $77. Calamine sold at $55 to $65, with the average for the week $60. Lead ore was weaker at $80, with the week averaging $81 because of higher early sales. We quote dealers' buying prices for scrap metals as follows: Light brass, 9.50c.; heavy yellow brass, 12.50c.; heavy red brass and light copper, 16c.; heavy copper and copper wire, 19c.; pewter, 25c.; tinfoil, 35c.; lead, 5c.; tea lead, 4c.; zinc, 8.50c.

For lighting or power service in small plants and for use as an exciter for large alternating-current generators in power stations, as well as for driving blowers, operating elevating and conveying machinery, etc., the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa., has developed a small direct-current generating set. The unit consists of a single or double cylinder automatic steam engine built by the American Blower Company and a direct-current generator mounted on the same base with the engine and directly connected to its shaft. The generators are wound to deliver 125 and 250 volts for lighting or power service.

The Malleable Iron Range Company, Beaver Dam, Wis., has taken out a group life insurance policy covering 254 employees in various departments, and aggregating $169,000. The men receiving the policies vary in age from 18 to 71 years. The maximum policy is $1,000. Employees in service more than three months and less than one year receive $300 policies, and $100 is added for each year's service after the first. The insurance is taken out in the Aetna Life under its new group plan.

Jacob D. Waddell, who is at the head of a company which proposed to build a sheet-mill plant at Niles, Ohio, has bought the buildings and equipment of the Atlanta Sheet & Tin Plate Company, Atlanta, Ind., consisting of four hot and four cold mills, all of which will be removed to Niles. It is likely that new sheet mills will also be erected. The entire plant will be operated by purchased electricity. Grading has started on the site, and foundation work will soon begin.

Iron and Industrial Stocks

NEW YORK, June 14, 1916.

All the developments of the past week have been construed favorably in the stock market and prices have steadily moved upward. The range on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal., com.	26⅝- 27¼	Ry. Steel Spring, com.	44⅜- 47½
Allis-Chal., pref.	82¼- 83	Ry. Steel Spring, pref.	97⅞- 98
Am. Can, com.	55¾- 59⅜	Republic, com.	46½- 49½
Am. Can, pref.	110 -111½	Republic, pref.	111⅛-111¾
Am. Car & Fdy., com.	59¼- 61½	Sloss, com.	53½- 55
Am. Car & Fdy., pref.	118⅛	Sloss, pref.	96¾
Am. Loco., com.	70½- 74¾	Pipe, com.	23½- 24½
Am. Loco., pref.	101¾-103	Pipe, pref.	53 - 53½
Am. Steel Fdries.	50⅛- 52	U. S. Steel, com.	83¾- 87⅜
Bald. Loco., com.	88¼- 92	U. S. Steel, pref.	117½-118⅛
Bald. Loco., pref.	109¾-110	Va. I. C. & Coke.	50 - 50½
Beth. Steel, com.	441 -445	Westing. Elec.	60⅛- 63⅜
Beth. Steel, pref.	135	Am. Rad., com.	395
Colorado Fuel	42½- 45⅝	Am. Rad., pref.	136
Deere & Co., pref.	90½- 92¼	Am. Ship, com.	44 - 46
Gen. Electric	170 -174¼	Am. Ship, pref.	89 - 90¼
Gt. No. Ore Cert.	36¾- 38⅞	Chic. Pneu. Tool.	73 - 74
Int. Harv. of N. J., com.	115 -119¾	Cambria Steel	85
Int. Harv. of N. J., pref.	117¾-119½	Lake Sup. Corp.	9½- 10⅛
Int. Harv. Corp., com.	82½- 83⅞	Pa. Steel, pref.	98
Lackawanna Stl.	67 - 73⅛	Warwick	9¾
Nat. En. & Stm., com.	24 - 24⅝	Cruc. Steel, com.	84 - 87½
N. Y. Air Brake.	132 -142	Cruc. Steel, pref.	117¼-118½
Pitts. Steel, pref.	97 - 97½	La Belle Iron, com.	51 - 51¼
Pressed Stl., com.	46½- 49¼	La Belle Iron, pref.	131 -131⅛
Pressed Stl., pref.	100¼-100½	Driggs-Seabury	124 -135
		Midvale Steel	63⅜- 65⅝

Dividends

The American Can Company, regular quarterly, 1¾ per cent on the preferred stock, payable July 1.

The Continental Can Company, regular quarterly, 1¾ per cent on the preferred, and 1¼ on the common stock, payable July 1.

The Eastern Steel Company, 7 per cent, on account of accumulated dividends on the first preferred stock, payable July 15.

The American Locomotive Company, regular quarterly, 1¾ per cent on the preferred stock, payable July 21.

The Baltimore Tube Company, 1¾ per cent on the preferred and common stocks, payable July 1.

The Worthington Pump & Machinery Company, initial quarterly, 1¾ per cent on the class A preferred stock. This is the reorganization of the International Steam Pump Company.

The Dominion Iron & Steel Company, two lapsed dividends of 1¾ per cent each on the preferred stock, payable July 1.

The American Iron & Steel Mfg. Company, regular quarterly, 1¼ per cent on the common and preferred stocks, payable July 1.

The Pettibone-Mulliken Company, 1¾ per cent on the first and second preferred stocks, payable July 1.

The Standard Coupler Company, 1 per cent on the common stock and 4 per cent on the preferred stock, payable June 30.

The Underwood Typewriter Company, regular quarterly, 1 per cent on the common stock and 1¾ per cent on the preferred stock, payable Oct. 2.

Interstate Bar Products Catalog

The Interstate Iron & Steel Company, First National Bank Building, Chicago, has issued a cloth-bound catalog of 71 pages describing the products made in its works at East Chicago, Ind., and Marion, Ohio. The company manufactures iron and steel bars and bands, small angles, small shapes for implement and other manufacturers, twisted and plain bars for reinforcing concrete work and rolled iron tie-plates. The works at East Chicago produce both iron and soft steel products, while those at Marion make bars, small angles and other small shapes from rail carbon steel.

In addition to a full description of the products, the catalog gives the bar and band extras of the National Iron Classification, adopted Dec. 3, 1895, and of the Standard Steel Classification as adopted in October, 1909, also tables of weights of various forms of iron and steel.

A powdered coal burning equipment, according to the Holbeck system, is to be installed at the works of the Standard Steel Works Company, Burnham, Pa., by the Bonnot Company, Canton, Ohio. The initial installation provides for a plant of 5 tons of coal per hour.

Large Contracts of Pennsylvania Engineering Works

The Pennsylvania Engineering Works, New Castle, Pa., has turned out more steel-works and blast-furnace equipment in the first five months of this year than any similar period in its history. Shipments of metal mixers since Jan. 1 include one 1200-ton for the Carnegie Steel Company's New Castle works and one 1300-ton for its Homestead works; one 1300-ton for the American Steel & Wire Company, Donora, Pa., and one 1200-ton for the Broken Hills Proprietary Company, New Castle, Australia. The company is now building one 1300-ton mixer for the Indiana Steel Company, Gary Ind., another of similar capacity for the Illinois Steel Company for South Chicago, one 1300-ton for the Youngstown Sheet & Tube Company, Youngstown, Ohio; a similar one for the Carnegie Steel Company's Clairton works, and a 1200-ton for the Mark Mfg. Company, Chicago. It is also building a 1300-ton mixer, which it will hold in stock. Steel-works equipment furnished this year includes one 25-ton converter, electrically operated, for the Jones & Laughlin Steel Company, Aliquippa, Pa.; two converters of similar capacity for the American Steel & Wire Company, Donora, Pa., and two for the Indiana Steel Company. Going through the shops now are two 25-ton converters, hydraulically operated, for the Illinois Steel Company and two 15-ton converters, electrically operated, for the Mark Mfg. Company. The company also has under way blast furnaces for the Bethlehem Steel Company, South Bethlehem, Pa., and the Pennsylvania Steel Company, Steelton, Pa.; a benzol plant for Carl Still, two 75-ton open-hearth furnaces for the Standard Steel Works Company, Burnham, Pa., three 6-ton Heroult electric furnaces for the National Malleable Castings Company, and a large number of ladles, hot metal cars, slag cars and other rolling-mill and steel-works equipment.

Horseshoe Manufacturers Consolidate

The Manufacturers' Iron & Steel Corporation, incorporated at Albany, N. Y., June 1, with an authorized capital of $8,000,000, of which $6,000,000 is issued, has absorbed the stock holdings of the Bryden Horseshoe Company, Catasauqua, Pa., and the Neverslip Horseshoe Mfg. Company, New Brunswick, N. J. Both of these companies will continue under their corporate names as before, the Manufacturers' Corporation simply being a holding company.

James W. Johnson, New Brunswick, N. J., has been elected president of the Manufacturers' Iron & Steel Corporation, and William J. McCurdy, New Brunswick, N. J., vice-president. Mr. McCurdy has also been elected president of the Bryden Horseshoe Company. The operative and executive staffs of the two respective companies, with the above exception, will remain as before.

The Bryden Company was organized in 1882 by the late Oliver Williams, and since the death of his son-in-law, George Holton, Mrs. Holton, a daughter of Mr. Williams, has been the president. The heirs of Mr. Williams have all sold their holdings.

The Superior Steel Castings Company, incorporated with $60,000 capital, will build a steel foundry at Benton Harbor, Mich., where a tract of ten acres has been bought. The incorporators are H. S. Goodman, Charles A. Pratt and Charles H. Strawbridge, of the Goodman Mfg. Company, builder of mining machinery, Chicago, which will almost entirely take the output of the foundry. An open-hearth furnace will be installed and a building is to be erected for it and the foundry which is to be 130 x 200 ft. S. E. Doster and R. W. Gilmore, experienced in making steel castings, are connected with the new company.

Cement shipments in 1915 increased slightly over those of 1914 while production and stocks decreased in about the same degree. The 1915 shipments were 750,863 bbl. valued at $358,627, a decrease of 422 bbl., but an increase in value of $7,257.

The New $5,000,000 Plant of the Mark Mfg. Company

In connection with the financing of its new construction, referred to in THE IRON AGE of June 1, the Mark Mfg. Company has made the statement that the Bessemer steel plant it is to build at Indiana Harbor, Ind., will cost $5,000,000, and will have a capacity of 270,000 tons of finished steel per year. The company's present pipe mills at Evanston, Ill., and Zanesville, Ohio, have a capacity of 200,000 tons a year, and when the new plant is completed will receive their skelp from it. The details of the Indiana Harbor works are as follows: Bessemer steel plant comprising two 15-ton converters with buildings, equipment and accessories, and a 1000-ton mixer; 35-in. blooming mill of Mackintosh-Hemphill design, with soaking pits, tables, shears, etc., and with rolls 80 in. in length and capacity to roll slabs up to 30 in. in width; 30-in. two-high billet mill designed to roll skelp from slabs; 10-in. skelp mill comprising a Morgan continuous roughing, edging and finishing mill; pipe mills comprising one butt and one lap weld mill, together with finishing and storage capacity. The electrical power plant will develop 10,000 kw. and all mills and equipment will be electrically driven.

Steel Corporation's Unfilled Orders Increase

The United States Steel Corporation's monthly statement for May showed an increase of unfilled orders on its books May 31, 1916, of 108,247 tons over April, making the total 9,937,798 tons, again the largest in the company's history. This is more than double those of a year ago, May 31, 1915, when they were 4,264,598 tons. The following table shows the unfilled tonnage for each month, beginning Dec. 31, 1912:

May 31, 1916	9,937,798	Aug. 31, 1914	4,213,331
April 30, 1916	9,829,551	July 31, 1914	4,158,589
March 31, 1916	9,331,001	June 30, 1914	4,032,857
Feb. 29, 1916	8,568,966	May 31, 1914	3,998,160
Jan. 31, 1916	7,922,767	April 30, 1914	4,277,068
Dec. 31, 1915	7,806,220	March 31, 1914	4,653,825
Nov. 30, 1915	7,189,489	Feb. 28, 1914	5,026,440
Oct. 31, 1915	6,165,452	Jan. 31, 1914	4,613,680
Sept. 30, 1915	5,317,618	Dec. 31, 1913	4,282,108
Aug. 31, 1915	4,908,455	Nov. 30, 1913	4,396,347
July 31, 1915	4,928,500	Oct. 31, 1913	4,513,767
June 30, 1915	4,678,196	Sept. 30, 1913	5,003,785
May 31, 1915	4,264,598	Aug. 31, 1913	5,223,468
April 30, 1915	4,162,244	July 31, 1913	5,399,356
March 31, 1915	4,255,749	June 30, 1913	5,807,317
Feb. 28, 1915	4,345,374	May 31, 1913	6,324,322
Jan. 31, 1915	4,248,571	April 30, 1913	6,978,762
Dec. 31, 1914	3,836,643	March 31, 1913	7,468,956
Nov. 30, 1914	3,324,592	Feb. 28, 1913	7,656,714
Oct. 31, 1914	3,461,097	Jan. 31, 1913	7,827,368
Sept. 30, 1914	3,787,667	Dec. 31, 1912	7,932,164

Additions to Ludlum Steel Company's Plant

The Ludlum Steel Company, 2 Rector Street, New York, manufacturer of crucible and alloyed steels, is having additions made to its plant which will greatly add to its output. A rolling mill will be constructed, 60 x 730 ft., as well as a furnace building, 40 x 340 ft., and a warehouse for raw materials. The Austin Company, Cleveland, Ohio, is the contractor. It is planned to have the work completed next fall.

The Sloss-Sheffield Steel & Iron Company's plans for a by-product coke-oven plant and benzol works at North Birmingham, Ala., are still in the hands of its finance committee, owing, it is said, to estimates which show an enormous increase of cost as compared with a few months ago. The company's program of immediate plant improvements includes four new hot blast stoves for the Birmingham furnaces; traveling and locomotive cranes for the Sheffield furnace, and a new ore washer, etc., at the Russellville ore mines.

J. M. Jones, 914 Munsey Building, Baltimore, Md., who will be the manager of the sheet and tin-plate plant which is being built at Sparrows Point for the Bethlehem Steel Company, has announced that the first 12 mills will be ready for operation on Jan. 1, and the next 12 six months later. Foundation work on the first unit has just started.

Frasse & Co.'s Centennial

Peter A. Frasse & Co., Inc., 417-421 Canal Street, New York, manufacturer, distributer and importer of tubing, steel, tools and supplies, in commemoration of the one hundredth anniversary of the founding of the house, has issued an artistic booklet entitled "One Century in Business." It contains several halftones of historic interest in connection with downtown New York, and pictorially, as well as by the printed word, brings the history of the company down to the present.

The company was founded by Henri Frederic Frasse, a native of Switzerland, in a modest little machine shop in Fulton Street, then known as Fair Street, New York, dealing principally in watch and clock makers' supplies. His ingenuity and clever workmanship brought him repair work on everything from a clock to an engine. He was probably the first to use the blanking press in the manufacture of clock tools and other work. His aid was enlisted by Robert Fulton, and in his shop was made the working model of Fulton's first steam boat. The model was later taken to England, and the engine for the Clermont was built in the plant of Boulton & Watts. The young machinist also designed the clockwork for torpedoes of Fulton's design. Mr. Frasse died in February, 1849, aged 68 years. The business he had established fell to Peter A. Frasse, a son, who conducted it under his own name.

The house progressed steadily, becoming of more and more importance as a source of machinists' supplies, and became Peter A. Frasse & Co. by the admittance of James M. Montgomery in 1868. The business was incorporated in 1891 after the death of Peter A. Frasse. One of the important developments, later, was a connection made about 1900 with the Shelby Steel Tube Company, under which arrangement the company became sole Eastern distributer for the Shelby cold-drawn seamless steel tubes, then principally used for bicycle frames. To-day it maintains individual warerooms for tubing, and carries a stock of more than 2,000,000 ft. Great strides were made also in facilities for supplying tool and other steels.

In 1915 the company purchased a tract of land at Hartford, Conn., and is now constructing an electric steel plant and warehouse, with departments for the annealing and heat-treating of steels, draw benches for cold drawing, and lathes for machining large steel bars. The home office in New York City, occupying a large building, is thoroughly departmentalized and contains modern facilities for storing, handling and cutting stock, all of which are illustrated in the booklet. Much of the success of the company is attributed to the progressiveness and energy of its president, Adolph E. Brion.

Low Phosphorus Iron from High Phosphorus Ores

The making of pig iron practically free from phosphorus and sulphur from an ore high in phosphorus is covered by a patent (U. S. 1,172,597, Feb. 22, 1916) granted to Paul L. T. Heroult, who died two years ago. Ordinary molten pig iron from the blast furnace is transferred to an electric arc furnace where a basic slag, containing as much lime as possible and some oxide of iron, is applied to the bath with the current so regulated as to maintain a temperature sufficient to keep the slag molten and maintain a chemical reaction between the slag and the metal, leaving the carbon content of the metal unchanged or only slightly reduced. After the desired dephosphorization the first slag is renewed and a second substituted consisting of lime and fluorspar with coke dust added, which removes nearly all the sulphur. It is claimed that this process produces from phosphoric ores a dephosphorized and desulphurized pig iron of the finest quality and at less expense than by any other process. Any type of arc furnace may be used, the Heroult being preferred.

The Brown Hoisting Machinery Company, Cleveland, Ohio, has taken an order from the Russian Government for six wharf cranes of 30 to 40 tons capacity for installation on the docks at Archangel.

PERSONAL

Edward N. Hurley, who has been vice-chairman, has been elected chairman of the Federal Trade Commission to succeed Joseph E. Davies. The commission has decided to adopt the practice of the Interstate Commerce Commission and observe annual rotation in the election of its chairman.

William B. Dickson has been elected second vice-president of the Midvale Steel & Ordnance Company and has resigned as secretary. D. Brewer Gehly, secretary and treasurer of the Cambria Steel Company, succeeds Mr. Dickson as secretary of the Midvale Steel & Ordnance Company. For the present his office will be in Philadelphia, as heretofore.

Charles P. Perin, New York, sails for London on Saturday, going thence to India. At Bombay he will present to the directors of the Tata Iron & Steel Company a report on the projected enlargement of the company's plant at Sakchi. Mr. Perin will be absent about four months.

Albert de Deken, a well-known Belgian chemist and metallurgist, who has been in this country the past nine months, sailed from New York June 10 on his return. He was connected with the steel industry in the United States for a number of years, and in the latter eighteen-eighties was chief chemist of the Carnegie Steel Company.

James M. Nelson, who recently resigned as superintendent of the open-hearth department of the Carnegie Steel Company's Ohio works at Youngstown, Ohio, has just been appointed superintendent of the open-hearth and duplex steel departments of the Algoma Steel Corporation at Sault Ste. Marie, Ontario. He has had over 20 years' experience as a foreman and superintendent. At Sault Ste. Marie he will be associated with Lawrence H. Cooney, general superintendent of the Algoma properties, formerly a Youngstown man.

R. B. Shover, formerly general superintendent of the Brier Hill Steel Company, Youngstown, Ohio, and for the past two years general manager of the Tata Iron & Steel Company at Sakchi, India, has resigned and will shortly leave for the United States.

Frank B. Richards, of M. A. Hanna & Co., Cleveland, Ohio, has been added to the list of directors of the Seaboard Steel & Manganese Corporation, New York.

I. Lamont Hughes, recently appointed general superintendent for the erection of the plant of the Canadian Steel Corporation at Ojibway, Ontario, Canada, was given a dinner by his friends and associates in the Ohio works of the Carnegie Steel Company at Youngstown, Ohio, last week. He was presented with a silver vase, lined in gold and worked in hand repousse.

George Robert Kraft, of Durban, South Africa, was in Pittsburgh recently consulting with manufacturers of steam shovels, concrete mixers and irrigation implements. He says he may purchase $1,000,000 worth of farm machinery in this country.

F. R. Blair, secretary, treasurer and sales manager of the S. K. F. Ball Bearing Company, has resigned to take the presidency of F. R. Blair & Co., Inc., with offices at 50 Church Street, New York. It is understood that Mr. Blair is engaged in developing motor efficiency devices.

The Read-Rittenhouse Company has been formed by R. W. Read and Henry L. Rittenhouse, both of Harrisburg, Pa., to handle the products of several steel manufacturing companies. The offices of the new company will be located in the Commercial Trust Building, Philadelphia. Mr. Read is district sales manager of the Steelton territory of the Pennsylvania Steel Company and Mr. Rittenhouse is sales manager for products of the forge department. Both have resigned, effective July 1.

Isaac H. Levin, 186 Hillside Avenue, Newark, N. J., has resigned his position as chief engineer and chemist of the International Oxygen Company for the purpose of devoting his time to chemical research and as a specialist in the electrolytic field.

J. L. Moore, who for the past seven years has been chief engineer of the Kerr Turbine Company, Wellsville, N. Y., has severed his connection with that company.

The Jeffrey Mfg. Company, Columbus, Ohio, announces the re-opening of its Northwestern branch office at Seattle, Wash., and the appointment of Percy E. Wright, consulting mechanical engineer, as district manager for Oregon, Washington, Alaska, British Columbia and Alberta. Mr. Wright has been in the Northwest since 1910 and his connection with the Jeffrey Company began in 1902.

E. A. Hatfield, for five years assistant secretary and manager of sales for the Bain Wagon Company, Kenosha, Wis., has resigned to organize the Mississippi Valley Motor Car Company, with headquarters in St. Louis, Mo. The resignation is effective July 1. The new company intends to build a large garage and service station, with branches throughout the Central West.

M. D. Tracy, of the purchasing department of the J. I. Case Threshing Machine Company, Racine, Wis., resigned June 1 to become assistant purchasing agent for the Advance-Rumely Company, LaPorte, Ind.

C. F. Herington has resigned his position as engineer in the mechanical engineering department of the New York Central Railroad to become engineer-salesman for the Bonnot Company, Canton, Ohio, in the development of pulverized coal burning apparatus under the Holbeck system. He is the author of a book now on the press on the use of powdered coal.

L. H. Webster has resigned as secretary and sales manager of the Webster Mfg. Company, Tiffin, Ohio, to become associated with the Palmer-Bee Company, Detroit, Mich.

OBITUARY

FOSTER F. BIRCH, Dover, N. J., died June 2, aged 74 years. Born in Ireland, he came to this country in 1868, settled in Newark, N. J., and subsequently went to Dover, where he started the Dover Boiler Works. He continued to conduct this business until 1911, when he retired in favor of his son, William F. Birch. He leaves his son and two daughters.

Mrs. CATHERINE FARRELL, mother of James A. Farrell, president United States Steel Corporation, died at South Norwalk, Conn., June 13, aged 81 years. She was the widow of John Farrell, formerly a shipowner in New Haven, Conn.

FRANK C. OAKLEY of the firm of Oakley & Keating, manufacturers of laundry machinery, Greenpoint, L. I., died June 1 at his home in Brooklyn, aged 48 years.

FRANK L. GOODRICH, vice-president National Sewing Machine Company, Belvidere, Ill., died June 2.

Blast-Furnace Sludge in the Furnace Burden

The use of blast-furnace sludge to wet down the furnace burden to better advantage, instead of water, and to also save the ore, passing off in the gas, is the subject of a patent (U. S. 1,171,696,—Feb. 15, 1916) taken out by Hermann A. Brassert and Walter Mathesius of Chicago. In general the blast-furnace gas passes into a dust catcher, where the heavier particles are removed, going then to a gas washer, where further cleansing takes place. The solid matter falls to the lower part of the gas washer and is discharged into a settling tank, which consists of a series of compartments with cone-shaped bottoms, each one with a connection from the bottom to a common pipe communicating with a storage tank, an outlet pipe from which leads to the skip tub. By opening a valve a quantity of sludge may be discharged into the tub and carried to the top of the furnace.

STRIKES AND WAGE ADVANCES

Pittsburgh and Northern Ohio

The soft coal strike in the Pittsburgh district is nearly over, and it is believed the mines will be running full by the end of this week. Most of the mines on the Wabash and Pittsburgh terminal roads have started, and the officials of the coal miners' unions are urging the men to return to work. Run-of-mine coal is being offered as low as $1.50 per ton, and probably could be bought at a lower price.

At Pittsburgh 11 men have been indicted for rioting in connection with the strikes at the Westinghouse Electric & Mfg. Company's works and were held for court. Fred H. Merrick, one of the leaders of the strikers, was indicted on two counts, one of inciting riot and the other of riot. Most of the men are foreigners. The maximum penalty for rioting or inciting riot in Pennsylvania is a fine of $500 and imprisonment for two years.

At a meeting of the Mahoning Valley Employers' Association held in Youngstown, Ohio, last week, it was decided to take no action for the present toward engaging machinists from other points to fill the places of the Youngstown idle machinists who have been on a strike since May 1 for an 8-hr. day with the same rate of pay as for 9 hr. No signs are visible that this strike will soon be settled, except that the machinists are said to be getting restless, many of them desiring to return to work.

Puddlers employed by the Youngstown Sheet & Tube Company, Youngstown, Ohio, who struck last week, objecting to the manner in which the company purposes to pay a recently granted wage increase have returned with no concessions. The men demanded the same rate for boiling and the same conditions of pay as obtain at the plant of the A. M. Byers Company, Girard, Ohio.

Machinists employed by the Standard Steel Car Company at New Castle, Pa., who went out on strike for an 8-hr. day, have returned to work under the same conditions as before.

New England

The New England labor situation continues to improve and the number of men on strike lessens day by day. The 500 strikers at the American Wringer Works, Woonsocket, R. I., have voted to return to work on the basis of a 10 per cent raise in pay and a 55-hr. week in place of a 56-hr. week. The strikers at the works of the Automatic Machine Company, Bridgeport, Conn., are returning in considerable numbers, and it is probable that this trouble will be of short duration. No concessions have been granted by the company.

Cincinnati

Practically all striking machinists who remained in Cincinnati have returned to work. The new men added to the forces in different shops are said to be developing rapidly into competent workmen, and the total output in the local machine shops can be conservatively estimated as ahead of the record on Oct. 1, 1915, when the first machinists' strike was called. At Urbana, Ohio, an affected plant has succeeded in obtaining a sufficient number of machinists to operate at nearly full capacity. No new developments are reported from other nearby manufacturing centers.

Chicago

At Chicago the foundry rate of $2.75 per day for 10 hr. applies to what is really common labor. In a great many of the foundries where machines are used the men on such jobs are merely handy men trained to run these particular machines, and while on piecework their pay frequently runs higher than that, the rate of $2.75 per day for the type of labor thus employed is claimed to be high. In the 8-hr.-day demand, instead of the pay per hour remaining the same, it is a case of giving an 8-hr. day for the same daily wage. It was the idea of the foundry workmen that their proposal would be equivalent to an increase in pay, but they discovered that what was wanted was not shorter hours in reality but more money, and dissatisfaction has arisen from the fact that the men now want to work 9 hr. with the same pay per hour as is provided for on the 8-hr.-per-day basis.

Other Localities

At Newark, N. J., June 8, union machinists voted to go out on strike June 15 for an 8-hr. day. The machinists claim the decision will affect about 300 shops employing approximately 8000 toolmakers and machinists.

A press dispatch from Aurora, Minn., states that nearly 700 miners are now on strike in that part of the Minnesota iron range. The trouble grew out of a demand for an 8-hr. day, $3 per day pay and recognition of the Industrial Workers of the World.

The Dominion Steel Corporation, Sydney, Nova Scotia, has announced a voluntary increase of 10 per cent in the wages paid to all workers in both its steel and coal departments. In the case of the steel workers, the 10 per cent increase goes into effect at once; with the coal workers, a 6 per cent increase is granted immediately, with 4 per cent to follow Jan. 1.

Pittsburgh and Nearby Districts

The Standard Bridge Tool Company, Pittsburgh, is furnishing two large automatic Thomas spacing tables for the new plant of the McClintic-Marshall Company at Pottstown, Pa. They are to handle the heaviest kinds of bridge and structural work, and will punch material up to 110 ft. long. Two Thomas machines for general steel car work have been ordered for the New Castle works of the Standard Steel Car Company, one large automatic machine for the Standard Car Construction Company, Sharon, Pa., and one special machine for the Tank Shipbuilding Company, Newburgh, N. Y. All these machines have special features in their construction.

Under direction of the local branch of the National Safety Council, plans are being made for a safety first rally to be held in Pittsburgh, June 19, 20 and 21. The Department of Labor and Industries of Pennsylvania, Pittsburgh Chamber of Commerce, University of Pittsburgh, Carnegie Institute of Technology and some large manufacturing concerns will participate in the program.

The Connellsville Machine & Car Company, Connellsville, Pa., has secured a short-term lease of the vacated plant of the Pittsburgh Safe Company in that city, where it will make some lines of machinery to aid it in keeping up with its rush of orders.

The Electric Materials Company, North East, Pa., has let contracts for the erection of an addition to its manufacturing and office buildings to cost about $50,000.

The Shoop Bronze Company, Tarentum, Pa., with a capital stock of $25,000, has been incorporated by E. V., Charles H. and George A. Shoop, Otto B. Lindquist and William F. Conklin, to manufacture castings.

Claire furnace of M. A. Hanna & Co. at Sharpsville, Pa., which has been running on Bessemer iron, has been blown out for relining and repairs.

The meeting of the Pittsburgh Foundrymen's Association on Monday, June 19, will take the form of an outing, to be held on the grounds of the Westmoreland Country Club, Greensburg, Pa. There will be outdoor amusements and dinner will be served in the evening.

The Pittsburgh Piping & Engineering Company, Pittsburgh, has filed notice of a stock increase from $150,000 to $300,000.

Wellston Furnaces Sold

The three blast furnaces of the Wellston Steel & Iron Company at Wellston, Ohio, which have been idle for some time, have been sold to S. E. Sternberger, Jackson, Ohio, for $198,711. The Milton furnace, also formerly operated by the company, has been sold to H. S. Willard, Sr., Wellston, for $71,555. It is the intention of the buyers to put the furnaces in blast as soon as possible. The Wellston Steel & Iron Company has been in the hands of receivers since Nov. 23, 1915, M. S. Sternberger and H. S. Willard, Jr., acting in that capacity.

Machinery Markets and News of the Works

LABOR IS INADEQUATE

New Plants in New England Hampered

Russian Purchasing Leads the Export Demand—Domestic Buying Scattered but Good in the Aggregate

Although there are few large inquiries before the trade, the aggregate of small and moderate-sized orders is good, and manufacturers have no cause to complain. The export demand continues to be heaviest from Russia. Several representatives of that country are quietly making purchases of equipment for automobile factories. One Russian inquiry is for 100 small turret lathes.

Tool-room equipment continues to be sought both East and West. In New England the scarcity of workmen is the dominant factor in holding back production in metal-working plants. Many new enterprises in that territory are ready for operation, and are now faced by the problem of acquiring working forces. These conditions are general, rather than local.

Some railroad business is still pending in Chicago. The demand for tool-room equipment is strong in that city, as it is in the East.

Makers of machines requiring electric drive are handicapped in Cleveland through their inability to get prompt deliveries on motors. In that city scattered buying is the feature. The foundries are crowded with work, and the scarcity of labor is general.

Several extensions to Michigan plants manufacturing automobile parts and accessories are expected to follow their purchase by the Motor Products Company, a New York corporation, and a new plant at Detroit is a probability.

Cincinnati reports that shrapnel shell contracts are nearing completion, but that there is activity in the larger sizes of high-explosive shells. While the foreign business continues to decline, that from domestic sources is fairly good.

In the East some new fuse business is coming out, though not a great deal.

The Pacific coast is troubled by a strike of river boatmen and dock workers at all ports.

New York

NEW YORK, June 13, 1916.

The demand for small machine tools, some of which are wanted in large lots, continues to be the leading feature of the local market. Some munitions business is coming out, most of which is for small parts not to be assembled where manufactured. A New Jersey company is inquiring for over forty hand screw machines to handle a contemplated order for fuse parts. Business of this sort can be attributed to the desire of those who have contracts for completed shells to obtain parts of which they are short, and so catch up on their deliveries.

Great Britain has been quietly doing some buying through her representatives in this country, some of the purchases involving tools specially designed. Leonid Smugge, representing the Michelson Works, Petrograd, has been inquiring for deliveries on about 100 turret screw machines.

The Midvale Steel Company has not yet bought the equipment it will require for finishing shells in its new plant at Nicetown, Philadelphia, although arrangements for some of the other machinery have been made.

The demand for hand turret screw machines is extremely good, and a pleasing feature is that a good deal of it is coming from small concerns here and there who heretofore have attracted but little attention. Well-known buyers, on the other hand, have also been active. The General Electric Company has been in the market for automatic screw machines, screw slotters and hand screw machines. The American Type Founders' Company, Jersey City, N. J., is buying a few additional machines for its Kelly press department. The Seaboard Air Line has closed against some long-standing inquiries. The Benjamin Eastwood Company, Paterson, N. J., has inquiries out for turret machines, likewise the Acme Mfg. Company, Boonton, N. J., which manufactures automobile specialties.

The manufacturers of plumbing supplies are buying here and there, and working at full pressure, despite the quiet state of the copper market. Bradstreet's reports that 28,544 building permits were issued in 132 cities in May, thereby making a new monthly record.

In northern New Jersey the iron foundries are greatly hampered by the shortage of molders and other skilled labor, and find it none too easy to get common labor. The machinists throughout that section have a demand pending for an 8-hr. day.

Announcement of terminal improvements for Suspension Bridge, N. Y., and Manchester, N. Y., were recently made by the Lehigh Valley Railroad. At Niagara Falls a 15-stall roundhouse, machine shop, store house, engine, boiler and oil house, etc., will be built. At Manchester, the present facilities will be replaced with a 30-stall roundhouse, new machine shop, boiler, engine and oil houses, and an office building also will be erected. At Niagara Falls a new car repair yard with necessary shops and storehouses will be built. At this point a concrete and steel coal pit 200 ft. long with elevated tracks will be constructed. Engines will be loaded by locomotive cranes. Turn tables 100 ft. long, built to handle the largest engines, operated electrically with air pressure auxiliaries, will be built at both places. At Manchester, special electrical apparatus will be installed to operate all machinery and light the yards. There will also be a large compressor layout for supplying air throughout the yards for testing purposes. The new freight station at Niagara Falls will be equipped with every modern device for handling freight. Work on both operations has been started.

The Air Reduction Company, 50 Broad Street, New York, recently incorporated, is building a number of plants for the production of oxygen for use in oxy-acetylene cutting and welding. Within the next few months it expects to have plants located in every section of the United States. It has bought the controlling interest in the Superior Oxygen Company, which has five plants located in Brooklyn, Pittsburgh, St. Louis, Chicago and Defiance, Ohio, and the first of its new plants is located in Philadelphia and has just started operations. The company also expects to go into the manufacture of carbide. Walter W. Birge is president.

The Duplex Engine-Governor Company, 36 Flatbush Avenue Extension, Brooklyn, N. Y., manufacturer of automobile engine governors, has increased its capital stock from $125,000 to $200,000 for the purpose of expanding its manufacturing facilities. Theodore Douglas is president.

The Onondaga Steel Company, Syracuse, N. Y., has been incorporated with a capital stock of $150,000 by S. S. Buckley, E. D. and E. R. Newkirk.

The United Paper Board Company, Thomson, N. Y., has completed plans for an addition to its factory.

The Art Button Company, Rochester, N. Y., has filed articles of incorporation with a capital stock of $100,000 to manufacture buttons. C. H. Brady, New York City; H. T. Noyes, Rochester, and C. L. Pearson, Pittsfield, N. Y., are the incorporators.

The Rochester Folding Box Company, L. W. Gerow, manager, 10 Commercial Street, Rochester, N. Y., has let contracts for erection of a one and two-story factory, 202 x 223 ft.

The Sanderson Works of the Crucible Steel Company of America Syracuse, N. Y., has let contract for erection of a boilerhouse and a one-story steel pickling house, 60 x 100 ft., at its plant on Magnolia Street, to cost $30,000.

The Acme Pattern & Machine Company, 38 Letchworth Street Buffalo, has purchased a site 100 x 220 ft., on Niagara Street, near Forest Avenue, upon which it will erect a machine shop, plans for which are now being drawn.

The Buffalo & Lake Erie Traction Company, Jefferson and Eagle streets, Buffalo, has let general contract for construction of a one-story car shop at Lackawanna City. Plans have been prepared by the United Gas & Electric Engineering Corporation, 61 Broadway, New York City.

Red Creek, N. Y., J. M. Jones, village clerk, will let contract about July 1 for the construction of a waterworks to cost approximately $30,000, including two triplex pumps of 200,000 gal. per 24 hr. capacity each, etc. H. C. Kittredge, Rochester, is the engineer.

The General Electric Company, Schenectady, N. Y., has let contracts for construction of a wire and cable factory, 200 ft. square, one story, to cost $90,000. C. G. Hulth is chief engineer, in charge of construction.

Bids are being taken for erection of a car shop, storehouse and office building for the Union Tank Line, adjoining the Pennsylvania railroad car shops at Olean, N. Y. Thomas Beaghein, 26 Broadway, New York, is general manager.

The International Casement Company, 516 East Sixth Street, Jamestown, N. Y., has let contract for the erection of a one-story brick factory, 125 x 128 ft., on Hopkins Avenue, East Jamestown.

The Hotaling, Warner Company, 720 North Clinton Street, Syracuse, N. Y., will build a powerhouse, 40 x 41 ft., one story and basement, at its plant, to cost $15,000.

The Covert Motor Vehicle Company, Lockport, N. Y., will add to its present plant a three-story and basement factory, 100 x 130 ft., of steel, concrete and brick, to cost $40,000.

The Taylor Instrument Company, Rochester, will build an addition, 40 x 60 ft., two stories, to its factory at Ames Street and West Avenue.

The water board, Elmira, N. Y., of which H. M. Beardsley is general manager, will soon let contract for a pump of 7,500,000 gal. per day capacity, electrically operated.

The Coates Mfg. Company, Wellsville, N. Y., will build a three-story addition, 70 x 80 ft., to its factory, to be used as a veneer and machine room. A finishing building, 80 x 100 ft., three stories, to cost $30,000, will be erected.

Philadelphia

PHILADELPHIA, PA., June 12, 1916.

Th S-S-E Company, 2300 Chestnut Street, Philadelphia, has purchased 20 acres of land at Erie Avenue and B Street from the Pennsylvania Railroad Company, and is having plans prepared for a one-story automobile factory, about 200 x 1000 ft., of brick and concrete, to be erected on the site. It will be equipped with machinery individually motor-driven, and many of the tools are to be constructed especially adapted to the company's needs. Plans have been formulated to produce about 1500 automobiles a year, making a chassis which will cost between $4,000 and $8,000 each. Victor Lee Emerson is general manager.

The William Cramp & Sons Ship & Engine Building Company, Beach and Ball streets, Philadelphia, has purchased 45 acres of land on Petty's Island in the Delaware River directly opposite the Cramp shipyard. It is stated a drydock will be built for the completion of vessels after launching.

Atlantic City, N. J., is negotiating for the purchase of 67 acres of land at the Inlet at a cost of about $50,000, to be used as a ship terminal.

The Philadelphia Textile Machinery Company, Hancock and Somerset streets, Philadelphia, has awarded contract to the Hennebique Construction Company, Drexel Building, Philadelphia, for the erection of a one-story concrete factory building, 25 x 264 ft., to be erected at Sixth Street and Tabor Road at a cost of about $5,000.

The Barrett Mfg. Company, Land Title Building, Philadelphia, has awarded contract to A. L. Carhart, 1326 Chestnut Street, for the construction of a one-story concrete and brick building, 55 x 65 ft., to cost about $10,000.

Plans for the new shoe factory for the Ferris Shoe Company, St. Louis, Mo., include a one-story powerhouse, 50 ft. square. Charles E. Oelschlager, Harrison Building, Philadelphia, and Albert B. Groves, St. Louis, Mo., are the architects.

The Blaisdell Machine Works, Inc., Vineland, N. J., has been incorporated with a capital of $50,000 and has taken over the business formerly run as Frost & Walls, which has been in existence since 1872. It does repair work and makes a specialty of medical, scientific and glassware tools. Herbert A. Walls, who is president, has been in the machine and hardware business about 20 years. G. J. E. Finch, first vice-president and superintendent, has been in the employ of the company 27 years. Harry G. Walls is secretary and treasurer.

Work has been started on the large plant to be erected at Chester, Pa., for the newly organized Sun Shipbuilding Company.

The Kent Mfg. Company, Clifton Heights, Pa., has increased its capital stock from $5,000 to $600,000.

The Landis Machine Company, Waynesboro, Pa., has filed notice of an increase in capital stock of from $500,000 to $1,000,000.

New England

BOSTON, MASS., June 12, 1916.

Although a lessened amount of buying in large lots is reported, there is little apparent diminution of business in the machine-tool centers. The demand from varied domestic industries has replaced the great volume of business from munitions plants and the makers of recognized standard machine tools are running at top capacity. A large number of new plants and extensive additions are just reaching the producing stage and the scarcity of workmen is still the dominant factor in holding back yet larger production. Inquiries for tools for foreign machine shops and automobile factories, particularly from Russia, continue to be received and it is reported that large orders of this character will soon be placed.

The Economic Machine Company, Worcester, Mass., has been reorganized, the control of its $200,000 of common stock passing from Horatio Gates, its president, and from the estate of Frank O. Woodland, its former treasurer, to the banking firms of Richardson, Hill & Co., Boston, and Bonney & Moor, Worcester. Daniel W. Gurnett, Boston, becomes president; Herman Stake, vice-president and works manager; Arthur J. Wallace, secretary and treasurer. George Putnam, Boston, and Carl Bonney, Worcester, complete the board of directors. Mr. Stake and Mr. Wallace have been associated with the company for several years.

The Chase Metal Works, Waterbury, Conn., are starting work on several additions to their plant on Thomaston Avenue. The buildings to be erected are 62 x 182 ft., five stories; 69 x 100 ft., one story; 60 x 100 ft., one story; 120 x 400 ft., one story.

The Metal Specialty Company, Waterbury, Conn., is asking bids on a factory, 98 x 170 ft., one story.

The American Brass Company, Waterbury, Conn., is having plans drawn for an addition, 75 x 150 ft., three stories.

The Scovill Mfg. Company, Waterbury, Conn., has awarded contracts to the Turner Construction Company, 11 Broadway, New York, for the erection of a laboratory, 50 x 213 ft., one story, and a factory addition, 70 x 352 ft., five stories.

The Graton & Knight Mfg. Company, Worcester, Mass., is to build an addition, 63 x 78 ft., four stories.

The Somerville Iron Foundry Company, Somerville, Mass., has been incorporated with capital stock of $50,000. The directors are Nathan H. Reed, president; Nathan P. Reed, treasurer; and M. D. Bingham.

Corrigan Brothers are preparing to build a machine shop at Millinocket, Me.

The Bay State Steel Corporation, capitalized at $250,000, is to be located at Brockton, Mass., through the efforts of the Brockton Chamber of Commerce. The plans for the plant include a factory, 65 x 160 ft., one story; a boiler house, 24 x 38 ft., and an office building, 32 x 43 ft. Electric power will be purchased. The new company will manufacture all kinds of steel furniture and the superintendent will be Mr. Carlson, now superintendent of the Art Metal Construction Company, Jamestown, N. Y.

George Muench, Stamford, Conn., has awarded a contract for a building, 34 x 134 ft., two stories, with an addition, 24 x 26 ft., one story. This is the third addition to this plant within a year.

The American Pin Company, Waterbury, Conn., has bought a lot of land, 390 x 540 ft., adjoining its plant on Thomaston Avenue.

The Machinery & Metals Company, Boston, Mass., has been incorporated with capital stock of $85,000. The directors are John M. Bullard, president; William G. Todd, treasurer, and A. C. Smith.

The Beaton & Corbin Mfg. Company, Southington, Conn., has purchased the floor and ceiling metal work business of the Peck, Stow & Wilcox Company, Southington.

The Boston Scale & Machine Company, Boston, Mass., has

been incorporated with capital stock of $300,000 by Donald M. Hill, Charles L. Flavinger and Dana T. Gallup.

The Jaquith Machinery Bureau, Boston, Mass., has been incorporated with capital stock of $10,000. The directors are Adelbert S. Jaquith, president and treasurer; William T. Barker, Jr., and M. A. England.

The Boston Woven Hose & Rubber Company, Cambridge, Mass., is receiving bids on a factory, 65 x 322 ft., four stories.

The New Departure Mfg. Company, Bristol, Conn., has awarded a contract for the erection of a number of houses for its workmen. The property is being laid out and the houses designed to make a modern industrial town of the best type. It is expected that 75 or 100 houses will be erected in all.

The Hunt-Spiller Company, Boston, Mass., is building a first-aid house, 13 x 18 ft.

The H. M. Sanders Company, Boston, Mass., has been incorporated with capital stock of $75,000 to manufacture hardware and builders' supplies. The directors are R. E. Cobb, president; Bertha E. Sanders, treasurer, and Arthur Southall.

The Philbrick-Booth Foundry Company, recently incorporated in Hartford, Conn., has awarded a contract for a foundry, 52 x 124 ft., to be erected on Homestead Avenue.

The foundations have been completed for an addition, 35 x 76 ft., two stories, to the plant of the Torrington Mfg. Company, Torrington, Conn.

The National-Acme Mfg. Company has awarded the contract for a tool room and storage building, 40 x 360 ft. and 140 x 360 ft., one and two stories, to be erected at its plant at Windsor, Vt.

The Remington Arms Union Metallic Cartridge Company, Bridgeport, Conn., has awarded a contract for an addition, 49 x 221 ft., with an ell, 41 x 65 ft., one story, to be erected on Barnum Avenue. The company is also to build several small storage buildings on Boston Avenue.

W. F. Rockwell, consulting engineer, 110 State Street, Boston, Mass., has been commissioned to equip and organize a plant for manufacturing automobile parts. Unless a suitable location can be found and leased, it is expected that the new company will build a plant to be ready for occupancy not later than Sept. 1. Plans are under way to place orders for the necessary equipment. The location will be Cleveland, Ohio, or vicinity.

The Mianus Mfg. Company, North Mianus, Conn., which controls three water-power sites on the Mianus River, plans to improve the undeveloped sites and will install hydroelectric equipment to supplement its present water power plant of 450 hp. Its auxiliary steam power plant is being increased by the installation of additional boilers to increase its capacity from 450 hp. to 725 hp.

Catalogs Wanted

The Everett Mfg. & Supply Company, manufacturer and dealer in supplies for stores, office buildings and factories, 97 Tileston Street, Everett, Mass., would be pleased to receive catalogs and price lists from manufacturers of machinery and metal goods. John C. O'Connell is manager.

Baltimore

BALTIMORE, MD., June 12, 1916.

The Welding Works, Inc., Baltimore, has been incorporated with $2,500 capital stock by William H. Detrick, Ruxton, Md.; Eric H. Murrell and Albert W. Foster.

The Baltimore & Ohio Railroad Company, Baltimore, will convert a roundhouse at South Cumberland, Md., into an erecting shop, at a cost of about $20,000.

The Longlife Roofing Company, Baltimore, has been incorporated with a capital stock of $40,000 by Charles K. Harrison, Jr., 409 Exchange Place; W. Stuart Symington, Jr., and Charles W. Summers.

The Hess Steel Company, Biddle Street and Loney Lane, Baltimore, has asked for bids on a transformer building and offices, 15 x 40 ft.

The Baltimore Enamel & Novelty Company, Woodall Street, Baltimore, plans the construction of a factory, 128 x 300 ft., at the foot of Allen Street.

The Maryland Steel Company, Sparrows Point, Md., is understood to be planning further extensions, including additional piers.

The Auto Appliance Mfg. Company, 11-13 East Twenty-first Street, Baltimore, will establish an automobile repair shop and install motors.

The Gomery-Schwartz Company, Wilmington, Del., is having plans drawn for a garage to cost $40,000 at Delaware Avenue and Tatnall Street.

The New Era Elevator & Machine Company, 111 North Charles Street, Baltimore, Md., is having plans drawn for a one-story brick addition to its machine shop, 40 x 70 ft., to provide for additional manufacturing facilities. It has taken contract for constructing about 200 machines for the Sanitary Seal Mfg. Company, 717 Title Building, Baltimore, Md. S. M. Beamer is president.

Chicago

CHICAGO, ILL., June 12, 1916.

In the machine-tool business the demand for toolroom equipment is most prominent. The market for lathes is exceedingly active. In a lot of 22 of these tools, 21 were sold by a Chicago dealer in a single day. The demand for universal and tool grinding machines, especially from the automobile trade, also continues very lively. Less interest is taken in manufacturing and turret lathes, a fact not surprising in view of the stabilizing of munitions work and the placing of the new orders with plants already equipped.

In the railroad field the Burlington is still negotiating, although the definite decision not to buy some tools, for which inquiry was recently sent out, appears to have been reached. The Santa Fe has resumed interest in the tools for which prices were taken in March and is asking for quotations on a few additional tools, as is also the Rock Island. The expectation of lower prices and the determination to wait until standard lines of equipment are again more promptly available are both factors in the postponement of railroad purchases.

A conspicuous new inquiry for export is from Russia for revolver-making machinery, much of it limited in source of manufacture. This, as well as other export business, is commanding very little attention in this market.

In small tools the supply of high-speed steel seems to be easier, partly due to Portuguese tungsten recently received, and increased production of alloys from American tungsten. The scarcity of high carbon tool steel is more pronounced.

The Automatic Air Furnace Company, Chicago, has been organized with a capital of $10,000 by R. W. Dunn, 10 South LaSalle Street, A. V. Brown and E. S. Thompson.

J. T. H. Patterson has had plans prepared for a two-story machine shop, 50 x 80 ft., to cost $15,000. The architects are Wheelock & Shank, 64 West Randolph Street.

Robert R. Baker, 1912 Margate Terrace, has awarded a contract to the A. Lund Construction Company for an addition to his factory, 75 x 117 ft.

Harry R. Gibbons, 600 South Canal Street, Chicago, manufacturer of boxes, has awarded contracts for a one-story factory to cost $20,000.

The Great Western Smelting & Refining Company, 626 West Forty-first Street, Chicago, is building a one-story foundry, 47 x 410 ft., to cost $50,000.

J. W. Aulson & Sons, manufacturers of tanning machinery, will move their plant from Lynn, Mass., to Waukegan, Ill.

Armour & Co., Omaha, Neb., meat packer, has awarded contract to F. P. Gould & Son, Omaha, for the construction of a beef house and ice manufacturing plant, 100 x 200 ft., and for machine shops, 40 x 200 ft., two stories, and 50 x 200 ft., one story. C. P. Richardson is purchasing agent.

The Union Pacific Railroad, A. L. Mohler, president, Omaha, Neb., has outlined a program for betterments and additions for 1916, which calls for $3,000,000 for additional double tracking, shop buildings, engine houses, terminal facilities, etc. W. A. Harriman, 165 Broadway, New York, is vice-president in charge of purchasing, and D. C. Smith, Omaha, Neb., is purchasing agent.

Cleveland

CLEVELAND, OHIO, June 12, 1916.

Considerable scattered buying of machine tools and lathes is noted with mill and grinding machines in good demand in small lots. Among the orders placed the past week was one for about one dozen machines for a Cleveland machine-tool plant. The demand for locomotive cranes is heavy. Steel plant equipment, including electric traveling cranes, is in good call. Makers of equipment requiring motors are handicapped in quoting on machines for fairly early delivery, owing to their inability to secure motors within several months. The demand for machinery and automobile forgings continues very heavy, but deliveries are delayed. Gray iron, steel and malleable foundries are apparently as crowded as ever with work. The scarcity of labor in foundries and machine shops continues.

Joseph Dyson & Sons, Cleveland, will enlarge their forge shop by the erection of a brick addition, 50 x 100 ft., and

will also install a new power plant. A heavy forging press or steam hammers, heating furnaces and an electric crane will be purchased. The equipment for the power plant has already been ordered, including a 300-hp. Sterling water-tube boiler and auxiliary equipment. The plant is engaged in making automobile and heavy forgings, none of its work being war orders, and the enlargement was necessitated by the natural growth of the business.

The Smith Gas Power Company, Lexington, Ohio, has been reorganized and has changed its name to the Smith Gas Engineering Company. The financial interests are now under the control of E. A. Deeds and C. F. Kettering of the Dayton Engineering Laboratories Company, Dayton, Ohio. The company reports a heavy demand for its equipment and is enlarging its plant, nearly doubling the former size.

The Ohio Steel Foundries Company, Lima, Ohio, has placed a contract for the erection of a pattern storage building, 55 x 150 ft., for its recently acquired plant at Bucyrus.

The American Steel Foundries, Alliance, Ohio, has under construction an addition to its plant, 50 x 150 ft.

The Toledo City Foundry Company, Toledo, Ohio, has been incorporated with a capital stock of $10,000 by J. C. Burke, J. Holzscheiter, and others.

The Wolverine Automobile Company, Toledo, Ohio, has been organized with a capital stock of $175,000 to build automobiles and has leased the factory of the Shelby Steel Tool Company on Dorr Street, providing nine acres of floor space. It is stated that A. H. Collins of Detroit will be president.

In addition to extensions now under way, the Miller Rubber Company, Akron, Ohio, will further enlarge its plant by two eight-story and two six-story steel buildings which will more than double its present capacity.

L. C. Wasser and G. E. Zimmer, Marion, Ohio, are establishing a pattern shop under the name of the Zimmer Job Machine Works in the building formerly occupied by the Marion Die, Tool & Machine Works.

The Fremont Stove Company, Fremont, Ohio, has commenced the erection of a steel addition to its plant, 40 x 200 ft., and plans to erect next year a new factory building and foundry.

Detroit

DETROIT, MICH., June 12, 1916.

The Motor Products Company, Detroit, has been incorporated under New York laws with $10,000,000 to take over the plants and business of the following manufacturers of automobile accessories: Rands Mfg. Company, Vanguard Mfg. Company, Diamond Mfg. Company and the Universal Metal Company, all of Detroit; the Superior Mfg. Company, Ann Arbor, Mich., and the Diamond Mfg. Company, Walkerville, Ont. It is expected that additions will shortly be made at all of the plants, with possibly a new factory at Detroit. The directors are W. C. Rands, C. F. Jenson, H. H. Seeley, D. B. Lee and M. L. Brown.

The Grant Iron & Metal Company, Detroit, has acquired a site of four acres in the northeastern part of the city, on which it will erect a new plant.

The Paige-Detroit Motor Car Company, Detroit, manufacturer of automobiles, has increased its capital stock from $1,000,000 to $2,000,000.

The Marx Brass Works, Detroit, has been incorporated with $10,000 capital stock to manufacture brass goods. The incorporators are George D. and Charles A. Grant, and Charles G. Marx.

The Climax Sales Company, Benton Harbor, Mich., has been organized to manufacture shock absorbers and automobile accessories. The incorporators are John Stiner, Walter H. Hanna and Frank E. Combs.

The National Tire Chain Company, Grand Rapids, Mich., has been incorporated with $35,000 capital stock to manufacture automobile tire chains. The incorporators are C. W. Hodge, J. H. Eckert and John Verwys.

The Detroit Organic Chemical Company, Wyandotte, Mich., whose plant was recently destroyed by fire, has acquired a new plant at Sibley, Wyandotte, Mich., which it is equipping to manufacture dyes.

Frans Franken, Holland, Mich., is at the head of a new company organized to manufacture dyes. It will erect at once two manufacturing buildings, each 60 x 300 ft., a small machine shop and an administration building.

The Paalman Furniture Company, Grand Rapids, Mich., has been incorporated with $70,000 capital stock to manufacture furniture. It has acquired a building and will install equipment at once. The incorporators are John H. Paalman, Chris Hondelink and L. B. Cumings.

The Chamber of Commerce, Muskegon, Mich., will erect a factory for the L. O. Gordon Company, manufacturer of automobile parts, to cost about $10,000.

Lewis G. Howlett, superintendent of the Industrial Works, Bay City, Mich., has purchased the machine shop and foundry of the M. Garland Company and will organize a company to operate the plant and continue the manufacture of conveying machinery and other apparatus under Garland patents. The manufacture of a line of machine tools will be added.

The planing mill of the Johannesburg Mfg. Company, Johannesburg, Mich., was destroyed by fire with an estimated loss of $25,000.

Cincinnati

CINCINNATI, OHIO, June 12, 1916.

It is reported that a few shrapnel shell contracts, let to nearby manufacturers, are nearing completion and that no overtures have been made for renewal of these contracts. The demand from abroad, however, for the larger sizes of high-explosive shells is still said to be urgent. The let-up in call for shrapnel has not been without its effect in the inquiry for lathes from munition manufacturers.

The foreign demand for machine tools continues to decline, but domestic business is fairly good. Lately the call for drilling machines has improved considerably. The boiler and tank business is only fair.

The Millcreek Tanning Company, Cincinnati, has been incorporated with $25,000 capital stock by Edward F. Schoening and others. Nothing has been given out as to manufacturing plans.

The Eagle White Lead Company, Cincinnati, has increased its capital stock from $1,000,000 to $9,000,000. Additions to its plant on Hunt Street are contemplated.

The Manufacturers' Production Company, Dayton, Ohio, is considering an addition to its plant on West Second Street. Details are not yet available, but in case reported plans are carried out a large number of machine tools will be required.

The Solar Metal Products Company, Columbus, Ohio, contemplates making an addition to its plant some time in the summer.

The Ford Motor Company, Detroit, Mich., will build a storage and assembling plant at Columbus, Ohio.

The Central Ohio Paper Company, Columbus, Ohio, has let contract for a reinforced concrete addition to its plant.

The Willys-Overland Company, Toledo, Ohio, is having a building at Columbus, Ohio, remodeled for storage purposes; but later an automobile assembling plant is contemplated.

The Foster Gear Company, Columbus, Ohio, has been reorganized as the C. A. S. Products Company, and incorporated with $100,000 capital stock. Charles B. Cutting is one of the principal incorporators.

The Lancaster Tire & Rubber Company, Lancaster, Ohio, is adding equipment to its plant.

The Ohio Gate Mfg. Company, West Jefferson, Ohio, has been incorporated with $10,000 capital stock by L. E. Evans and others. The company will manufacture a metal farm gate.

Milwaukee

MILWAUKEE, WIS., June 12, 1916.

The general tone of business in nearly all metal-working lines is quieting down and reports from all branches of the industry indicate that the market is steadier than it has been in more than eighteen months. Capacity for a long time ahead, however, is well taken up, and shops are still working at extended schedules to fill back orders and to take care of pressing requirements for single tools. Increases in the capital stocks of metal-working companies continue. The scarcity of labor is restricting production and making it inadvisable to extend facilities, even if it were possible to get desired deliveries. A demand for labor is coming from the lead and zinc mines of southwestern Wisconsin, which are enjoying the most prosperous conditions in years.

The Milwaukee Stamping Company, Milwaukee, manufacturer of hardware specialties and steel stampings, Sixty-fourth and Pullen avenues, West Allis, will award contracts within 10 days for a one-story addition, 72 x 122 ft., of reinforced concrete and brick, to cost $17,500. The architect is Charles L. Lesser, 599 Seventy-first Avenue.

The Philadelphia & Reading Coal & Iron Company, Mil-

waukee, is increasing the capacity of its coal docks on the Menomonee Canal by the construction of an extension, 180 x 320 ft. The Hansen Construction Company is in charge.

Fairbanks, Morse & Co., Inc., Chicago, which recently announced plans for additions and extensions to its Eclipse works, Beloit, Wis., to cost $400,000, has increased its capital stock from $1,000,000 to $4,000,000. Of the additional issue it is stated that $750,000 will be used in Wisconsin. C. H. Morse, Jr., is president.

The Milwaukee County board of supervisors will request the architects, Leenhouts & Guthrie, 428 Jefferson Street, to prepare new plans for a chair factory to cost only $80,000. Bids will be asked some time in July. Louis G. Widule is county clerk.

The American Safety Lock Company, Grand Rapids, Wis., has been organized to manufacture a special safety lock for elevators, machinery, engines, etc. For the present the device will be made by the Grand Rapids Foundry Company, but the company expects to erect a plant of its own soon. C. A. Normington, Otto R. Roenius, Charles B. Natwick and A. B. Sutor are stockholders.

Hugh Agner, Burlington, Wis., has purchased a site on Geneva Street and will erect a garage and repair shop, of reinforced concrete and brick, 60 x 150 ft., two stories and basement.

The New Idea Plaster Board Company, Fond du Lac, Wis., will remove its business to South Milwaukee, Wis., where a new plant, 50 x 200 ft., one and two stories and basement, is under construction. Not all the equipment has been purchased. It manufactures a composition board for general construction purposes.

The Wisconsin Welding & Cutting Company 315 Fourth Street, Milwaukee, is increasing its capacity and has increased its capital stock from $3,000 to $10,000.

The Kieckhefer Box Company, Sixteenth and Canal streets, Milwaukee, has awarded contracts for the erection of a new shipping house to cost $35,000.

Metzig Brothers, Berlin, Wis., manufacturers of automobile jacks and similar accessories, are installing new automatic metal-working machinery, chiefly punches and shapers.

The Fountain-Campbell Lumber Company, Donald, Wis., is preparing to erect a large sawmill in Ladysmith, Wis., to employ 150 to 200 men. Considerable new machinery is being purchased.

The Peerless Floor Surfacing Machine Company, Oshkosh, Wis., manufacturer of electrically-operated surfacers for hardwood and terrazzo floors, has increased its capital stock from $30,000 to $50,000.

The Northern Casket Company, Fond du Lac, Wis., has increased its capital stock from $200,000 to $400,000. It has also taken over the Sioux City Casket Company's plant, Sioux City, Iowa, which it will enlarge.

The Olsen Concrete Mixer Company, Elkhorn, Wis., has delivered its second large unit to the Thomas B. Jeffery Company, Kenosha, Wis., which is making extensive improvements.

F. J. Klinger and A. R. Mayer have purchased the machine shop and garage at 211 Second Street, Watertown, Wis., until now operated by E. L. Foss.

The Gillette Safety Tire Company, Eau Claire, Wis., is rushing work on the first unit of its new plant, and has contracted for $30,000 worth of tire and rubber machinery and equipment with the Adamson Machine Company, Akron, Ohio. The main building is 60 x 250 ft., and will produce 100 to 150 tires daily at the start. From 75 to 100 skilled workmen will be employed. R. B. Gillette is general manager.

The M. Kratchwil Candy Company, Front and Pearl streets, LaCrosse, Wis., has awarded contracts for the erection of a three-story and basement addition to cost $25,000, and to include a cold-storage plant.

The Badger-Packard Machinery Company, dealer in iron and wood-working machinery, etc., Milwaukee, Wis., has removed from 76 West Water Street to 133-139 West Water Street, to provide for its increasing business, and give it better display space.

Indianapolis

INDIANAPOLIS, IND., June 12, 1916.

The American Air Craft Company, Anderson, Ind., has increased its capital stock from $105,000 to $500,000.

The Nu-Way-Pump Company, Indianapolis, has been organized with $10,000 capital stock to manufacture pumps, tanks, machinery and accessories. The directors are Charles S. Shotwell, Albert G. Miessen and Edward W. Harris.

The Kerosene Carburetor Company, Frankfort, Ind., has been incorporated with $50,000 capital stock to manufacture iron, brass and other metal products. The directors are M. T. McCarty, E. A. Stinson and M. Stinson.

The Star Self-Feeder Company, Lafayette, Ind., has been incorporated with $10,000 capital stock to manufacture agricultural implements. The directors are George L. Potter, William S. Potter and Charles B. Phelps.

The Seymour Furniture Company, Seymour, Ind., has been incorporated with $160,000 capital stock to manufacture furniture. The directors are J. K. Elliott, E. C. Heuser and R. A. Greeman.

The Lawall Vulcanizer & Mfg. Company, Richmond, Ind., has been incorporated with $10,000 capital stock by Lewis C. Lawall, M. E. Lawall and M. Rohe.

The Indiana Brass Works, Frankfort, Ind., has let contract for the erection of a melting room, 43 x 105 ft. New crucibles and other equipment will be installed.

The plant of the International Steel & Iron Company, Evansville, Ind., is being rebuilt and new machinery will be installed.

The Lawndale Mfg. Company, Elkhart, Ind., has been incorporated with a capital of $75,000 by A. H. Beardsley, James A. Bell and W. H. Foster to manufacture automobile parts.

Newton Kelsay, hame and harness manufacturer, Evansville, Ind., is erecting a brick foundry.

The Gilderman Foundry & Machinery Company, La Porte, Ind., will erect a new factory, 60 x 200 ft.

The Lavelle Foundry, Anderson, Ind., will build a one-story brick addition, 40 x 140 ft., which will double the size of its plant. New machinery will be installed.

The T. W. Warner Company, Muncie, Ind., is making further extensions which include an addition, 28 x 240 ft., to the main building, an addition, 32 x 32 ft., to the heat treating department, and a new stock room, 26 x 132 ft.

The Miller-Pedlow Company, Indianapolis, Ind., has been organized with a capital of $2,000 by William F. Miller, Richard Pedlow and Theodore Schuller to manufacture and repair boilers.

St. Louis

ST. LOUIS, MO., June 12, 1916.

Machine-tool business in St. Louis continues active. Deliveries continue to improve and new enterprises are being developed somewhat more freely now that equipment is more easily obtained. New tools do not accumulate on the floors, neither do second-hand machines. Altogether the demand is well above the actual supply, particularly in the heavier types of equipment.

The Missouri Malleable Iron Company, East St. Louis, Ill., will erect a new machine shop, 40 x 130 ft., to cost $16,000.

The Thomas H. Keppel Mfg. Company, St. Louis, has been incorporated with a capital stock of $100,000 by Thomas H. Keppel, Tancred Hust, C. D. Halley, James M. Smith and J. B. Thomas to manufacture pneumatic machinery and tools.

The Light & Development Company, St. Louis, Mo., will take over the plant of the company now supplying electric light and power in the Flat River lead-mining district of Missouri, and will enlarge and remodel it.

The Century Electric Company, St. Louis, has bought a five-story building adjoining its plant and as soon as the present lease expires, will install equipment to increase its output.

The Standard Blue Flame Gas Generator Company, Kansas City, Mo., has been incorporated with a capital stock of $50,000 by Frank H. Stanard, J. T. Edling and M. L. Stanard to manufacture gas burners, etc.

The St. Joseph Furniture Company, St. Joseph, Mo., has been incorporated with a capital stock of $80,000 by H. A. E. Mueller, C. W. Sanders and Oscar Warner to manufacture furniture.

The Phillips-Palmer Tractor Company, Kansas City, Mo., has been incorporated with a capital stock of $15,000 by Victor L. Phillips, A. L. Palmer and B. J. Copeland to manufacture farm tractors and machinery.

The Bonne Terre Foundry Company, Bonne Terre, Mo., has been incorporated with a capital stock of $18,000 by P. A. Benham, S. F. Gilday and W. W. Reynolds.

The Kansas Crusher Company, Kansas City, Mo., has been incorporated with a capital stock of $12,000 by W. A. Ross, M. Ross and James A. Taylor to equip and operate rock-crushing plants.

A brick plant to cost equipped about $250,000, is to be established at White Hall, Ill., as a result of negotiations of the local Business Men's Association.

The Independent Gin Company, Lake City, Ark., has been incorporated with a capital stock of $18,000 by William Craddock, J. H. Carter and W. M. Perkins and E. M. Stotts. J. L. Magers is manager.

The Rogers Ice & Cold Storage Company, Rogers, Ark., will equip a cold storage plant to cost about $18,000.

The J. H. Phipps Lumber Company, Fayetteville, Ark., which recently increased its capital stock to $400,000, is erecting an addition for which it is in the market for equipment.

The Tatums Gin Company, Tatums, Okla., has been incorporated with a capital stock of $15,000 by S. B. Carter, L. B. Tatum and J. C. Carter and will equip a cotton gin.

The Cottonwood Oil Mill Company, Ringling, Okla., has increased its capital stock from $60,000 to $75,000 for the purpose of adding to its equipment.

The Merchants Oil Company, P. O. Box 1509, Muskogee, Okla., of which William Owen is president and manager, will equip an oil-refining plant with a daily capacity of 800 bbl.

The Osage Gasoline Company, Nowata, Okla., has been incorporated with a capital stock of $300,000 by Thomas J. Elliott, Nowata, Okla.; W. H. McCrum and John J. McPherson, Kansas City, Mo., and will equip a gasoline plant.

The Tiger Refining Company, Okmulgee, Okla., has been incorporated with a capital stock of $250,000 by W. Thornburgh, R. Steinhorstand, Benjamin Kalkhoff and will equip a refinery with a capacity of 1000 bbl. daily to refine oil, etc. The equipment is to be bought at once.

Duncan, Okla., will construct a waterworks plant and is reported in the market for two gas engines of 40 hp. each, one centrifugal pump of 150 gal. per min. capacity, tanks, etc.

The Rockett Foundry & Machine Works, Hattiesburg, Miss., will equip a general repair plant and a brass foundry. Equipment is wanted, including a bed planing machine, double spindle lathe, radial drill, etc. N. W. Rockett is manager.

Oakdale, La., T. L. Addington, mayor, will receive bids until June 28 for oil engines, pumps, valves and other waterworks plant equipment.

The Lutcher & Moore Cypress Lumber Company, New Orleans, La., has purchased a large cypress acreage in St. John the Baptist parish and will equip mills to cut the timber.

The Central South

LOUISVILLE, KY., June 12, 1916.

It is reported in the local machinery field that new orders are plentiful. Inquiries continue numerous and, as a rule, rather insistent. Manufacturers, however, are bending their energies to get out the business on hand and giving it their attention and efforts. In the electrical field the demand for tools, motors and generators continues brisk.

The Louisville Cooperage Company, Louisville, has obtained permits for the reconstruction of its cooperage plant, burned some time ago. The estimated cost of rebuilding is $45,000. Louis Keller & Sons are the general contractors.

The Reliable Paint Company, Louisville, incorporated with $20,000 capital, plans a plant for the manufacture of paint. W. E. Mullin, formerly superintendent of the Charles R. Long, Jr., Paint Company; W. L. Kennett and E. Mantle of Louisville, are the incorporators.

The Compressed Inner Tube Company, producing a solid rubber device for use inside automobile tires, projects a factory in Louisville to manufacture this device, which is now being made for it by contract. S. S. Bush and Samuel A. Culbertson, Columbia Building, are in charge of plans.

The B. F. Goodrich Company, whose Louisville office is at Third and Breckinridge streets, is advertising in the local papers for machinists to go to its new plant at Akron, Ohio.

Lee I. Parks, as president of the Lexington Machine & Mfg. Company, Lexington, Ky., has taken over the business of the company and will conduct it hereafter individually under the name of the Lexington Machine Company.

Preparations are being made by the Leigh Banana Case Company, Chicago, manufacturing a patented package, to move its plants at Cairo, Ill., and Evansville, Ind., to Paducah Ky., about July 1. Q. C. Leigh is president.

In connection with the construction of a new garage, the Carney Auto Company, Clarksville, Tenn., announces that its present garage will be converted into an automobile repair shop.

The Chattanooga Machinery Company, Chattanooga, Tenn., recently re-organized by A. D. Catlin and associates, has leased a section of the Chattanooga Stamping & Enameling Company's plant and will equip it to turn out woodworking devices. Later the company proposes to establish a plant of its own.

The Paducah Automobile & Mfg. Company, Paducah, Ky., recently incorporated with $25,000 capitalization, will erect and equip a plant for manufacture of automobile parts, etc.

Thomas Lyle and J. C. Butler are opening a broom factory at Paducah, Ky., to give employment to 50 operatives.

The tipple, conveyors and electric motors of the Majestic Coal Company, at Majestic Ky., were destroyed by fire at a loss of $40,000. It is stated that they will be rebuilt.

The Kentucky Electrical Company, Owensboro, Ky., is asking for prices on a 24-in. lathe, milling machine, and a small, four-spindle drill press to take, maximum, a 5/16-in. drill.

The Harlan Motor Company, Harlan, Ky., with $6,000 capitalization, has been incorporated by W. W. Lewis, J. W. Farmer and C. E. Bell and proposes to establish a garage.

Fire practically destroyed the foundry of the Robert Jakes Company, Fourth Avenue and Harrison Street, Nashville, Tenn., causing losses estimated at $9,000. Robert, J. W. and E. L. Jakes compose the company.

Used 1 and 2-hp. electric motors are wanted by the Jonesboro Supply House, Jonesboro, Tenn.

T. C. Helstand, J. F. Scott, P. J. Curran, and others, have incorporated at Knoxville, Tenn., the Tennessee Oil & Varnish Company with $50,000 capitalization. The corporation will continue the present company, and proposes to enlarge the plant and increase its output.

Texas

AUSTIN, TEX., June 10, 1916.

Crop conditions all over the State, with the exception of a strip of territory bordering the lower Gulf coast, are above normal. The machinery and tool trade shows some improvement over that of a week ago, according to the dealers. From Arizona and New Mexico come reports of an increase in the demand for mining machinery and mill equipment.

The city commission, Van Alstyne, will build a new water pumping station and make other improvements.

The Sour Lake Ice, Light & Power Company, capitalized for $50,000, will build and operate an electric light and power plant and an ice factory. F. H. Carpenter is president.

The Citizens' Planing Mill Company, Dallas, will rebuild its planing mill, recently destroyed by fire with a loss of $25,000.

The National Hydroelectric & Construction Company, which began the construction of a dam across the Colorado River at Marble Falls several years ago, as a preliminary step toward the building of a large hydroelectric plant, has succeeded in financing the project and will carry it to early completion. C. H. Alexander, Dallas, is president. The company is negotiating with the city commission of San Antonio with the view of furnishing the municipality with 20,000 hp.

The Houston, Richmond & Western Traction Company, Houston, will award contract soon for the construction of its electric power station. Capt. Edward Kennedy, San Antonio, is president.

The Colorado Fuel & Iron Company will build a large concentrator at its iron-ore mines at Fierro, N. M.

The Pacific Northwest

PORTLAND, ORE., June 6, 1916.

A general strike of river boatmen and waterfront workers at all Pacific ports has tied up traffic rather badly for the last few days, and caused serious interruption in the placing of orders; but it is hoped that the trouble will be quickly adjusted. If labor troubles can be avoided no curtailment of activity is expected in this district. In fact, most conditions favor a further expansion of business, as the effects of lumber and shipbuilding activity are becoming apparent in many other lines. Large single orders for machine tools are lacking, but the single-tool business has been unusually active of late, and the shop supply trade is rushing. There is a fair amount of railroad buying.

The State penitentiary shops at Salem, Ore., were recently burned, and the State Board of Control has decided to rebuild at once.

The pattern shops of the Puget Sound Iron & Steel Works, on the tide flats at Tacoma, Wash., were completely destroyed by fire May 28. The loss is estimated at $25,000.

The Seattle Car & Foundry Company, Seattle, Wash., is bidding on the construction of 1000 steel freight cars for the Russian Government, to be delivered at Vladivostok.

The Port of Seattle Commission is taking bids this week for a locomotive crane for the central waterfront district.

The Shasta National Copper Company has been incorporated at Redding, Cal., with a capital of $5,000,000 to develop claims in northern California, and plans to start work shortly on a smelter, etc. W. H. McEwen, C. F. Rouillard, M. P. Fries and S. S. Norton of Redding, Cal., are the directors.

The Royal Milling Company, Great Falls, Mont., will erect a six-story building at a cost of $150,000 to increase its capacity from 1100 bbl. to 2500 bbl.

The Seaborn Shipyards Company, Tacoma, Wash., plans the establishment of a shipyard in Tacoma on a site recently secured, and will construct two five-masted lumber schooners. Charles Seaborn is president.

The Coin Controlled Lock Company, Nampa, Idaho, has recently been incorporated for $150,000 by S. L. Flowers, Burns, Ore.; D. E. Standard and Eugene Emerson, Nampa, and plans the establishment of a plant in Nampa to manufacture a coin-operated lock.

The salmon cannery plant of the Northwestern Fisheries Company, Kenai, Alaska, was recently destroyed by fire with a loss of $60,000.

The O'Neil-Irving Company, Spokane, Wash., plans the expenditure of $150,000 during the year in logging and flume building in the Mica Creek district in Idaho. A 12-mile flume is included in the improvements planned.

The Newspaper Stuffing Machine Company, Seattle, incorporated for $150,000, has shipped its first newspaper stuffing machine. Severin Halvorsen, owner of the Diamond Machine Works, Seattle, which is manufacturing the machine, is the inventor. The Diamond Machine Works has recently installed machinery to manufacture the machine.

The wheat tank manufacturing plant constructed by Houck & Son, Aberdeen, Wash., will be in operation within ten days. It will be electrically operated.

The National Fruit Cleaner & Grader Company, The Dalles, Ore., successor to the Oregon Fruit Cleaner Company, has increased its capital stock from $40,000 to $250,000 and will immediately erect a plant to manufacture a machine invented by O. K. Porter, which has been in litigation for several years.

The Blewett Harvester Company, Pendleton, Ore., plans to establish a foundry and the erection of an assembling shed at its plant. The company reports an unusually busy season.

Canada

TORONTO, June 10, 1916.

Reports from all parts of Canada state that there is a constantly increasing demand for all kinds of manufactured products. Some of the leading Canadian manufacturers state that this will be the greatest year in their history, and that they are able to fill only a portion of the business offered to them. New industries are springing up in all parts of the Dominion, and the prospects for an extended period of prosperity were never so excellent. At no other period in Canada's history has labor been at such a premium, many of the industries with more than capacity orders having to decline new business on account of the difficulty in securing labor. The farming districts are experiencing the same difficulty as the manufacturers in this regard.

During the first five months of 1916 the Imperial Munitions Board has placed with factories throughout the Dominion orders for $6,000,000 worth of merchandise, this being entirely exclusive of the millions of dollars' worth of ammunition orders.

The Canada Foundries & Forgings, Ltd., with plants at Welland and Brockville, is working at full capacity day and night. Its export trade is said to exceed its capacity. The hardware department is exceedingly busy, while the forging departments are now working at full capacity, including recent additions.

The Canadian Locomotive Company, Kingston, is experiencing an increasing demand for all of its products, and the influx of orders has been so great that it recently decided to double the capacity of its plant. The company has received an order from the Canadian Government for 30 locomotives. Aemilius Jarvis, Toronto, is president.

A report from Regina states that there is a great demand for agricultural implements. Agricultural implement firms in Saskatchewan report that they are this year experiencing a general increase of about 40 per cent in the volume of business over last year.

J. G. Hussey, Windsor, Ont., is in the market for tinsmithing tools and machines, also an 8-ft. cornice brake.

At a meeting of the creditors of the National Pipe & Foundry Company of Canada, J. Reid was appointed liquidator and H. McCullough, representing the Merchants Bank, J. E. Armour, representing the Crown Trust Company, and H. R. Wood, representing the Standard Securities, were appointed inspectors. The company manufactures pipe and other iron and steel products and has a plant at Alexandria, Ont.

The Thresher Machine & Tractor Company is having plans prepared and will commence the erection of a plant at Calgary, Alberta, about Aug. 1.

The Dominion Cutlery Company, Montreal, has been formed and will build a plant there for the manufacture of cutlery, etc.

Armstrong-Whitworth of Canada, Ltd., Longueuil, Que., will double its plant so as to provide for the manufacture of steel tires for locomotives and passenger rolling stock, at a cost of $750,000. M. J. Butler is managing director.

The Royal Paper Box Company, Brantford, Ont., is calling for tender for the erection of a brick and concrete factory to cost $12,000. J. Evans, 30 Water Street North, Galt, Ont., is the architect.

The Harris Abattoir Company, Ltd., Toronto, has had plans prepared for the erection of an addition to its plant at the union stock yards to cost $50,000.

The City Council, Moose Jaw, Sask., will spend $12,300 on extensions and the installation of new equipment in the power plant.

The Canadian Sprayer Company is contemplating the erection of a plant at Trenton, Ont., to manufacture sprayers and gasoline engines.

The Wallace Shipyards, North Vancouver, B. C., have been awarded contracts for the construction of three steel vessels to cost $400,000. The company has purchased a site and will build a new plant, the contract for the first unit having been awarded to T. Allan of Lynn Valley.

The city controllers, Winnipeg, Man., have recommended the purchase of a motor to replace a defective one driving the 5,000,000-gal. per day pump at the city waterworks. W. P. Brereton is city engineer.

The Automobile & Supply Company, Toronto, is building a garage at 249 Simcoe Street, at a cost of $24,000.

The Gutta Percha Rubber Company, Ltd., Toronto, has received permits for the erection of a two-story brick shop and garage on West Lodge Avenue, to cost $18,000; a two-story brick reclaiming plant to cost $30,000, and a four-story brick factory to cost $31,000.

The harbor commission, Toronto, will commence at once on the erection of a brick machine shop on the Don Division to cost $13,500.

Construction work has been commenced by the Peter Lyall Construction Company, Montreal, on the new union station at Toronto to be erected at a cost of $3,400,000.

The Maple Leaf Tires, Ltd., Toronto, has been incorporated with a capital stock of $500,000 by Rupert K. Grimshaw, 24 Brookmount Road, Edward J. Swift, Harry C. Long and others.

The Sorel Shipbuilding & Coal Company, Ltd., Montreal has been incorporated with a capital stock of $100,000 by William K. McKeown, George E. Chart, Lorne C. Herdman and others to build and operate boats, drydocks, etc.

The Tillsonburg Metal Stamping Company, Tillsonburg, Ont., which was recently established there by J. C. Inman, has been taken over by the Chatham Malleable Steel Company.

Alfred Laprise, superintendent of the General Car & Machinery Works, P. O. Box 256, Montmagny, Que., is asking for catalogs and prices to replace those destroyed by fire.

M. Brennan & Son, Hamilton, Ont., are in the market for a 40 or 50-hp. motor.

The Alberta Pacific Elevator Company, Calgary, Alberta, has announced that it will build 15 grain elevators in Alberta this year.

McPhalen & Ross, 828 Seventh Avenue East, Vancouver, B. C., are in the market for a logging engine, size about 10 by 12, half-breed type, to carry 3000 ft., 1⅛-in. line.

The Chesley Chair Company, Ltd., Chesley, Ont., is in the market for a wood lathe.

The Flint Varnish & Color Works, Toronto, has commenced the erection of a factory to cost $16,000.

Will P. White, Ltd., Toronto, has been incorporated with a capital stock of $75,000 by William P. White, Francis P. Walsh, Archibald C. Macnaughton, and others, of Toronto; Frederick B. Watson, Montreal, to manufacture cutlery, jewelry, buttons, etc.

Government Purchases

WASHINGTON, D. C., June 12, 1916.

Bids will be opened June 26 by the purchasing agent of the Alaskan Engineering Commission, Seattle, Wash., for furnishing, under circular 188, class 2, one locomotive crane; class 10, machines for tin shops.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, schedule 9757, to be opened July 3, for three air compressors for Boston or Newport; schedule 9770, opening date not set, for sixteen air, fuel oil and other pumps for Norfolk and Mare Island; schedule 9779, opening date not set, for forty-eight ½-in. portable electric drills and twelve electric bench grinding machines, for Brooklyn; schedule 9782, date of opening not set, for sixteen valve reseating machines, for Norfolk.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, June 6, for supplies for the naval service, as follows:

Schedule 9633, Ordnance

Class 21, Newport—Two 2-spindle horizontal drilling machines—Bid 64, $2,600; 141, $5,650; 153, $3,984.

Class 22, Newport—One chucking outfit, motor-driven—Bid 153, $5,628; 238, $2,982.

Schedule 9655, Ordnance

Class 161, Washington—One 36-in. triple geared lathe—Bid 90, $7,808; 100, $9,530; 128, $6,827 and $6,512.

Schedule 9657, Steam Engineering

Class 181, Portsmouth—Two 1½ x 18-in. turret lathes, belt-driven; alternate, same, for one machine, motor-driven—Bid 141, $5,460 and $2,415, alternate.

Class 182, Portsmouth—One horizontal boring, drilling, and milling machine—Bid 128, $8,075; 153, $7,542.

Class 183, Portsmouth—Two two-spindle drill presses—Bid 100, $335 and $184.95; 106, $167 and $377; 115, $279; 126, $174; 141, $153.25.

Class 184, Portsmouth—One electrically driven centrifugal oil separator—Bid 100, $453; 115, $459; 126, $550 and $395; 135, $417.

Class 185, Portsmouth—One 18-in. universal turret lathe—Bid 115, $1,000 and $808; 126, $1,080, $1,150 and $1,175.

Schedule 9680, Ordnance

Class 351, Washington—One multiple recording and indicating pyrometer—Bid 56, $66.90, part; 78, $65.10, part; 107, $1,362.60; 198, $1,192.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 56, Charles Engelhard; 64, Walter H. Foster Company; 78, Hoskins Mfg. Company; 90, I. H. Johnson, Jr., Company, Inc.; 100, Kemp Machinery Company; 106, Leland-Gilford Company; 107, Leeds & Northrup Company; 115, Manning, Maxwell & Moore, Inc.; 126, D. Nast Machinery Company; 128, Niles-Bement-Pond Company; 135, National Separator & Machine Company; 141, Pratt & Whitney Company; 153, Prentiss Tool & Supply Company; 198, Thwing Instrument Company; 238, Warner & Swasey Company.

The following bids were opened by the commanding officer, Frankford Arsenal, May 29, under proposal No. 309 for machining 8084 forgings for 4.7-in. steel shells, in accordance with drawing B-1385, dated May 10, 1916, and as per specifications:

The International Clay Machinery Company, Dayton, Ohio, $1.31 each; forgings to be rough turned and no grinding required; delivery 1000 per week commencing 40 days after receipt of shell, complete within 90 days.

The South Brooklyn Machine Corporation, Brooklyn, N. Y., $2.74 each; add 51c. each if award is divided in half; delivery 150 per day commencing 60 days after order, complete in five months.

The Watertown Arsenal, Watertown, Mass., $2.83 each, $4.19 each for entirely completed shell; delivery 125 per day beginning Aug. 1.

The Watervliet Arsenal, Watervliet, N. Y., $3.10 each for entire lot; delivery 500 on Sept. 1 and 850 per month thereafter, complete by June 1, 1917.

The Washington Steel & Ordnance Company, Washington, D. C., $5.05 each; delivery 2000 per month, commencing 60 days after order, complete four months thereafter.

The Wheeling Mold & Foundry Company, Wheeling, W. Va., $5.50 each; delivery 210 days.

The Metal Products Company, Beaver, Pa., $6.99 each; delivery 2500 per month commencing 30 days after order, complete three months thereafter.

The Bethlehem Steel Company, South Bethlehem, Pa., $7.25 each; delivery to commence in six months, complete one month thereafter.

The Increase in Tin-Plate Exports

Tin and terne plate exports from the United States are constantly expanding, those for April being the largest recorded for one month. Comparative figures from Government sources are as follows:

	Gross Tons
January, 1916	12,177
February, 1916	13,570
March, 1916	20,363
April, 1916	21,384
Average per month, Jan.-Apr., 1916	16,873
Average per month for 1915	12,878

The average for the first four months of this year, 16,873 tons per month, represents 202,476 tons per year. This compares with a total of 154,541 tons in 1915, 59,548 in 1914 and 57,812 in 1913.

The exports for the 10 months to May 1, 1916, were 175,137 tons, against 65,210 tons to May 1, 1915. Of those to April 1, 1916, South America took 23,154 tons; China, 13,975 tons; British India, 10,100 tons, and Japan, 13,673 tons—all large increases over any previous record.

Great Britain's tin-plate exports for the first four months of 1916 were 116,379 gross tons, an average of 29,095 tons, or at the rate of 349,140 tons per year. In 1915 the British exports were 368,602 tons, which compares with 435,392 tons in 1914 and 494,497 tons in 1913.

The Canton Foundry & Machine Company, Canton, Ohio, operating a large pattern shop, foundry and machine shop, making alligator shears, automobile and industrial shop turntables, portable floor cranes and hoists, sheet metal machinery, etc., has under contemplation the erection of several large additions to its plant, embodying a much larger foundry and an extension of the machine shop, which will increase its capacity about 75 per cent. It is now building and will have fully erected within the next two to three weeks a new shop for the manufacture of portable cranes and also to house the blacksmith department.

The Forest City Machine & Forge Company, Cleveland, Ohio, has completed a new machine shop, 100 x 286 ft., at 5110 Lakeside Avenue. This plant, which was erected by the Samuel Austin Company, Cleveland, was put up in a very short time. Excavation was started May 8, on which date the steel was received for the building; the foundations were completed May 18, and the erection of the steel, which was started on that date, was completed in five days. The building was entirely finished June 5 and is of standard design, with brick walls and steel sash.

The Bierman-Everett Foundry Company, maker of iron castings and welding supplies, Irvington, N. J., is building an addition to its foundry which will provide a new pickling room and a grinding room and double the size of its core room. The expansion of the company's business has made the increased facilities necessary. It has also bought additional land for storage purposes, and to permit of future growth. The new building will be ready for occupancy July 1.

The Bay City Foundry & Machine Company, recently incorporated with a capital of $100,000, has begun operations in the plant of the Garland Company, Bay City, Mich. It is planned to build conveying, sawmill and paving-block machinery and later make machine tools. The company's foundry will specialize in automobile work. Officers chosen are John C. Rose, president; L. G. Howlette, vice-president and manager; W. W. Chapman, secretary; Norris R. Wentworth, treasurer.

The Nichol-Straight Foundry Company, manufacturer of machinery castings, 319-323 West Austin Avenue, Chicago, has leased additional foundry space and has thus doubled its capacity and equipment. Its West Austin Avenue foundry will be operated the same as heretofore and will be Foundry No. 1. The additional foundry was known as the Dauchy Foundry, located at 215-223 West Illinois Street, Chicago, and will be Foundry No. 2.

NEW TRADE PUBLICATIONS

Boilers and Engines.—Ames Iron Works, Oswego, N. Y. Collection of bulletins. Calls attention to a number of different styles of boilers and engines. The boilers listed include portable units mounted on skids or wheels, horizontal tubular, locomotive and return tubular types. Mention is also made of the various styles of fronts that can be supplied for use with the boilers and a standard setting is also shown. The engines include the Stumpf una-flow and side and center crank automatic engines and a four-valve type using Corliss valves. A separate bulletin is given to each different engine or boiler and contains illustrations and descriptions, the latter being supplemented in a number of cases by engravings of the various parts.

Gas Plant Construction.—Stone & Webster Engineering Corporation, Boston, Mass. Booklet. Shows a number of coal and water gas generating stations and high and low pressure distribution systems that have been built or extended. A list of the companies for which contracts were executed is given, together with a statement of the work done and references to the engravings illustrating the operation. In taking up each individual contract a list of the various portions is presented with data on the size and capacity, followed by a lot plan or map and a series of halftones of the different portions of the plant.

Pressed Steel Building Construction.—Trussed Concrete Steel Company, Youngstown, Ohio. Pamphlet. Contains illustrations and descriptions of the use made of pressed steel joists and studs with Hy-rib in building construction. An improved type of fireproof floor, in which wood joists and lath are eliminated, is described with particular reference to the advantages of light weight and economy and simplicity of construction. Various types of these floors, including their use with reinforced concrete beams, structural steel and masonry walls, are shown and tables giving the carrying capacity, results of tests, etc., are presented. The use of the construction in partitions and bearing walls is dealt with and tables of carrying capacities and complete specifications for the erection of floors, partitions, roofs, ceilings, etc., are included. The various standard sections are illustrated with information on their properties, weights, etc.

Storage Battery Trucks.—Automatic Transportation Company, Buffalo, N. Y. Illustrates a line of storage battery freight, baggage and industrial trucks and engines. After a brief general description of the construction of the truck and the way in which the power is transmitted from the motor to the wheels, the several types are illustrated and briefly described, condensed specification tables being included in each case. Among the trucks covered is one with an elevating platform, which was illustrated in THE IRON AGE Jan. 27, 1916. A number of views of trucks transporting different kinds of material are included.

Fire Door Hardware.—Richards-Wilcox Mfg. Company, Aurora, Ill. Catalog No. 14. Shows a line of hardware for fire doors of the sliding and swinging types. Illustrations of the various fixtures are presented with brief descriptions, and a number of views are included of the fixtures applied to doors. A number of arrangements of cords, where the fusible link controlling the motion of the door must come in the center of the opening, are shown, and mention is made of a line of standard tin-clad fire doors and shutters, corrugated sheet metal fire doors, angle iron frames and sills, fusible links and locks. Illustrations of the various expansion bolts and anchors used for fastening the fixtures in position are included.

Speed Recording Instrument.—Schuchardt & Schütte, 90 West Street, New York City. Folder. Illustrates the tachoscope, which is a revolution counter combined with an anti-magnetic stop watch. The instrument is designed so that the revolution counter and the stop watch will start simultaneously as soon as a slight pressure is applied to the center spindle and stop as soon as the pressure is removed, the dial thus indicating the number of revolutions made by the object under test in the elapsed time. Illustrations of the instrument, which is designed to measure either right or left hand rotation up to 30,000 r.p.m., in its carrying case and also in use are presented.

Wagon and Truck Loaders.—Jeffrey Mfg. Company, Columbus, Ohio. Bulletin No. 177. Refers to a line of self-propelled wagon and truck loading machines for handling crushed stone, clinker, coke, sand, gravel, etc. The machines have a capacity of 1 to 1½ cu. yd. per minute, which enables them to load trucks or wagons in 3 or 4 min. and save the wages of from two to five laborers. A self-propelling device enables one man to operate the loader as it is fed into the pile and move the machine about under its own power, which is supplied either by an electric motor or an internal combustion engine. One of the features of the loader is a collapsible elevator which enables it to be used in all locations and especially where low sheds, trestles or other overhead obstructions are encountered. A number of engravings of both the rigid and collapsible types in use supplement the descriptive matter and several testimonial letters are included.

Projectile Marking Machine.—Noble & Westbrook Mfg. Company, Hartford, Conn. Circular. Pertains to a machine for marking heavy projectiles on the end. A brief description of the operation of the machine which was illustrated in THE IRON AGE, Jan. 27, 1916, is presented together with an engraving of the machine. Among the points upon which special emphasis is laid are the fact that no lifting of the shells is required to remove them from the machine after they are marked, while the use of separate dies reduces the cost and enables 300 shells to be marked each hour.

Punching and Shearing Machines.—Buffalo Forge Company, Buffalo, N. Y. Bulletin. Illustrates and describes a line of hand and power punching and shearing machines, including hand tools for cutting round, square and twisted bars and structural shapes, continuous slitting shears, angle iron cutters, punching machines for structural shapes and power machines for heavier work. The machines are mounted either on legs, iron or concrete bases or in some instances on wheels for ready movement around the shop. The descriptions are brief covering the principal points about the machines and a table of the different sizes that can be supplied is included in a number of cases. Mention is made of portable and stationary bending machines for angles, tees, flats, rails, copper tubing, wrought-iron pipe and odd sections; riveting machines, blowers, forges and hand and power vertical drilling machines.

Electric Motors.—C & C Electric & Mfg. Company, Garwood, N. J. Bulletin No. 101. Points out the advantages of using the company's type SL direct-current motors, which are of the four-pole type and are built in sizes ranging from 1 to 125 hp. The construction of the motors is gone into at some length with a number of engravings of the different parts. The bulletin contains a complete table of adjustable and constant speed ratings with complete dimensions for all the frames made. A number of engravings of applications of the motor to machine tools, pumps, for operating gate valves, etc., are included.

Lubricant.—Texas Company, 17 Battery Place, New York City. Booklet. Lists the various uses to which the company's Crater compound can be put as a lubricant, the especial fields for which it is adapted being wire rope, chains and bearings where heat, speed, pressure, water or contaminating chemicals are present. After a brief description of the compound, its use for various purposes is taken up and in a number of cases illustrations of the apparatus on which the lubricant has been used are presented together with testimonial letters. Instructions covering the application of the lubricant are included.

Screw Plates.—Russell Mfg. Company, Greenfield, Mass. Catalog No. 2. Describes and illustrates a line of double reversible die and open die screw plates. Following the illustration and brief description of each screw plate is a list of the assortments that can be supplied. Mention is made of special screw plates that are provided with round adjustable dies for brazed brass tubing and for automobile work. An alphabetical index and another of catalog numbers are included.

Hydraulic Forging Machinery.—Chambersburg Engineering Company, Chambersburg, Pa. Calendar hanger. Contains a calendar for the year beginning June 1 and also complete calendars for 1916 and 1917 in the lower portion of the hanger, while the upper section is given over to an engraving of a 10-ton steam drop hammer.

Grab Buckets.—Edgar E. Brosius, Pittsburgh, Pa. Bulletin. Illustrates the various uses to which a single hook grab bucket may be put with brief explanatory notes adjacent to the engravings. A description of the construction and operation of the bucket is presented and this is followed by data on the size of bucket required for various materials. A drawing showing the bucket in the dumping, closing and closed positions is included with a table of the several dimensions of the different sizes.

Quick-Acting Vise.—Fisher & Norris, Trenton, N. J. Circular. Covers a quick-acting vise operated by a foot lever which was illustrated in THE IRON AGE, Jan. 20, 1916. The advantage of the vise is that the free use of both hands for placing the work that has to be clamped between the jaws is permitted, a forward push with the left foot on the pedal transmitting the motion to the front jaw for gripping, while the application of pressure to the other pedal releases the work. An illustration of the vise and a table of the sizes in which it can be supplied are included.